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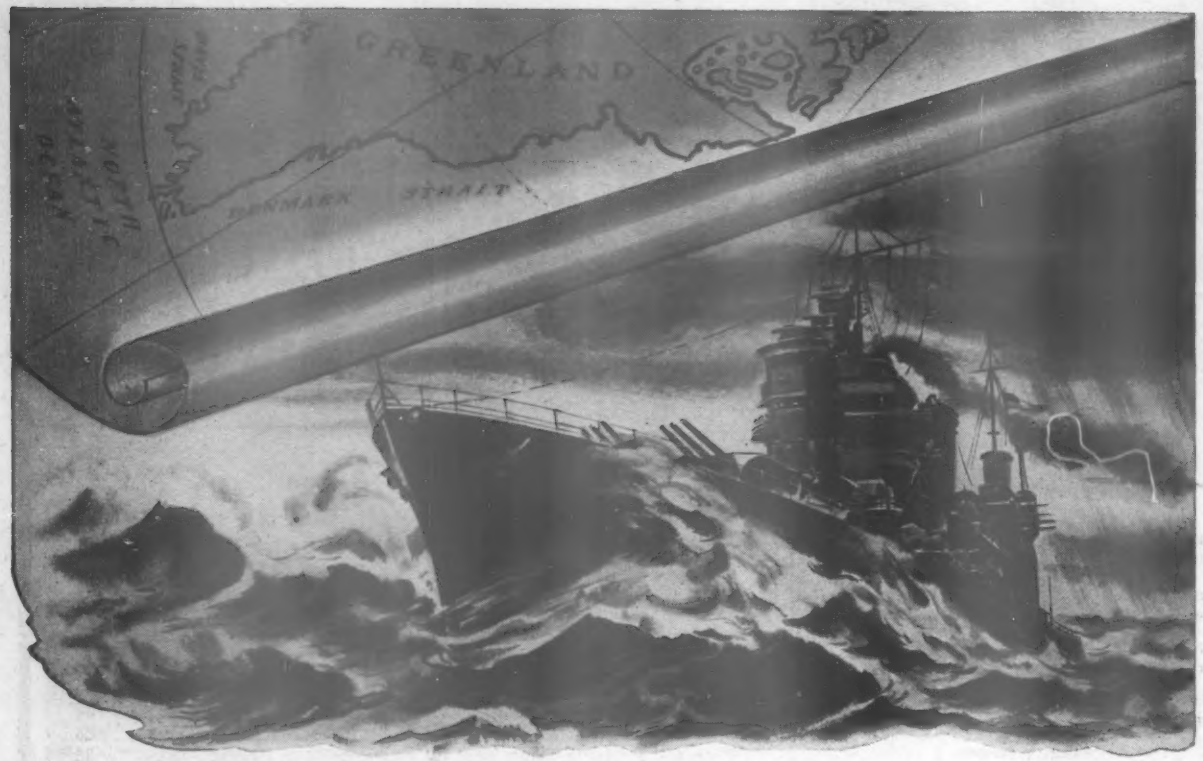

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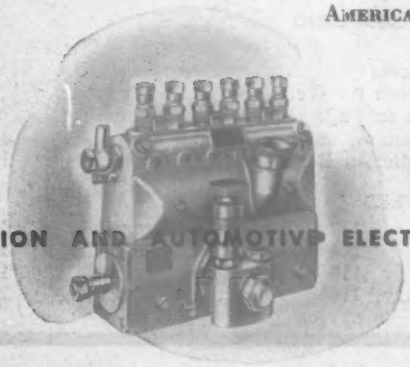


AMERICAN BOSCH

AVIATION AND AUTOMOTIVE ELECTRICAL PRODUCTS • FUEL INJECTION EQUIPMENT

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States — Page 96

CRUDE-OIL STOCKS 239,145,000 bbl. as of Feb. 5—down 1,106,000. One year ago 232,823,000 bbl.

GASOLINE STOCKS 81,784,000 bbl. as of Feb. 5—up 699,000 bbl. One year ago 89,698,000 bbl.

RESIDUAL FUEL-OIL STOCKS 52,734,000 bbl. as of Feb. 5—down 123,000. One year ago 71,680,000.

GAS OIL AND DISTILLATE 36,153,000 as of Feb. 5—down 1,113,000. One year ago 37,900,000.

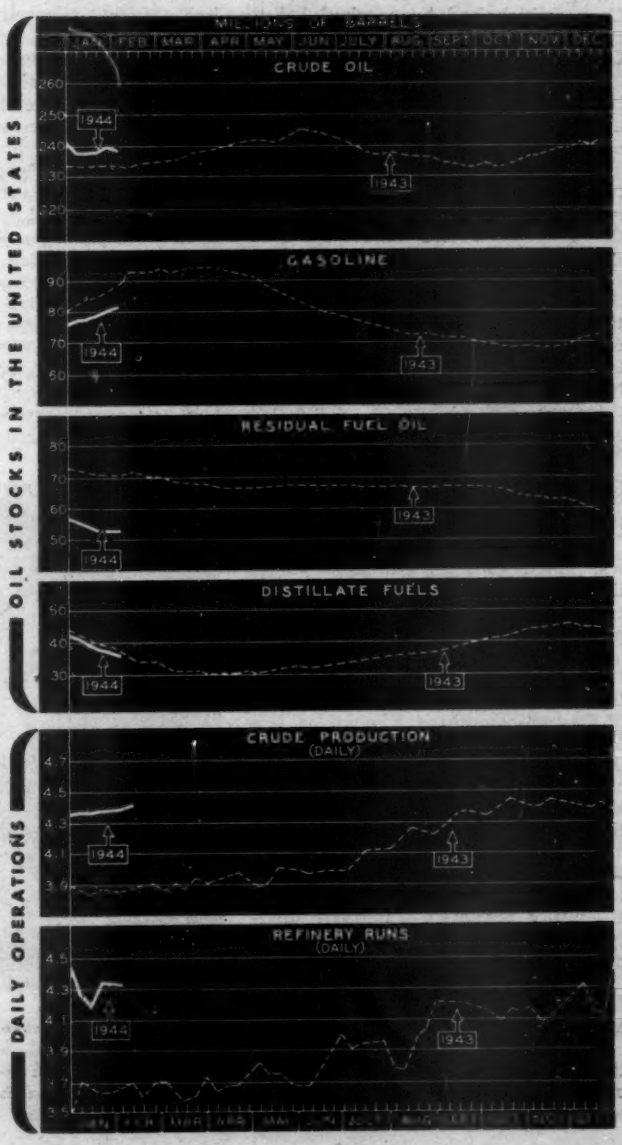
CRUDE-OIL PRODUCTION 4,412,960 bbl. daily average—up 17,170 bbl. One year ago 3,864,400.

REFINERY RUNS 4,324,000 bbl. daily week ended Feb. 5—down 35,000 bbl. One year ago 3,649,000.

IN domestic operations refiners and the Washington agencies are being flooded with inquiries from jobbers and consumers as to whether there will be additional restrictions in the use of gasoline by civilians in the immediate future. Most refiners, through their own outlets or from jobbers, have more orders for March and later delivery than their projected refinery operations indicate they will be able to fill. While no definite statements have been issued, analyses of the Washington agencies have pointed to reductions in certain civilian uses, with the effective date uncertain. It is now certain that the domestic industry will enter the main gasoline-consuming period starting next month with inventories substantially under those of the same period of last year. As of February 6, the A.P.I. reports show that stocks of finished and unfinished gasoline were 8,469,000 bbl., or 9 per cent, under the corresponding date of 1943 and 21,389,000 bbl. under 2 years ago.

COMPARED to a year ago, 4,901,000 bbl., or 60 per cent of the reduction for the entire country, is accounted for by the California decline. The seriousness of the West Coast situation has been generally known for several weeks. The importance of the West Coast in war production and the petroleum needs in connection with the war plans for the Pacific, have been stressed by commentators. The war agencies have said that the local supplies of California will be supplemented with whatever outside shipments are required to meet wartime requirements. This situation has to be taken into consideration in determining the quantities of gasoline that will be available over the next few months east of the Pacific Coast states.

THE percentage reductions in gasoline stocks east of the Pacific Coast compared to a year ago are: Texas, Louisiana, Arkansas and East Coast (combined area), 7 per cent; Indiana, Illinois and Kentucky, 7 per cent; Rocky Mountains, 3.5 per cent. Gasoline stocks in the Oklahoma, Kansas and Missouri refining area are 5 per cent greater than a year ago, with an increase of 4.7 per cent in the Appalachian area. The situation in the combined area and in the middle western states, which account for 80 per cent of the gasoline stocks east of the Pacific Coast, will be a controlling factor in what happens over the next few weeks.



Permanent Petroleum Policy Expected to Result From Broadened Senate Study

by Henry D. Ralph

WASHINGTON, D. C.—A thorough study of the entire foreign petroleum situation and the formulation of a national oil policy will be undertaken in the U.S. Senate immediately.

This broad study was substituted at the last minute for a special investigation of the Petroleum Reserves Corp., which had been scheduled to open February 15 with Secretary Ickes as the principal witness.

Action will be taken under a resolution introduced February 9 by Senators Brewster of Maine and Moore of Oklahoma calling for a committee of nine senators "to make a full and complete study and investigation with respect to petroleum resources, and the production and consumption of petroleum and petroleum products, both within and outside the United States, in their relation to our national welfare and security." The committee is to consist of three members each from the Senate committees on foreign relations, interstate commerce and foreign commerce and is directed to report the results of its study at the earliest practical date "together with its recommendations for the formulation of a national petroleum policy."

This new approach to the subject was taken with the full approval of the subcommittee of the interstate commerce committee which was to have opened hearings on the Brewster-Moore resolution to liquidate PRC. Chairman Johnson of Colorado, with the approval of the other members of this subcommittee, announced late February 14 that he had asked that the subcommittee be discharged in order that a committee of broader scope might study both the operations of PRC and all other aspects of foreign petroleum affairs. This action came after Ickes had prepared to go before the subcommittee with a lengthy prepared statement justifying and explaining the recently announced contract with Standard Oil Co. of California, The Texas Co., and Gulf Oil Corp. to construct a pipe line across Saudi Arabia. Committee members denied that the PRC investigation was dropped because Ickes had presented a fait accompli in the form of a definite contract agreement, and declared that the objective is to consider the entire foreign-oil situation and develop a definite policy in cooperation with all government agencies concerned.

Government Proceeding With Plan

Meanwhile, the Government lost no time in moving ahead on the pipeline project, discounting impressions that plans would be held in abeyance pending completion of the congressional investigation. A reconnaissance party, it was understood, will leave for Arabia as soon as arrangements can be completed, probably between March 5 and 10. Burt E. Hull, president of the Texas Pipe Line Co. and vice president and general manager of the War Emergency Pipelines, Inc., has been mentioned as the logical man to head the government mission of pipe-line experts. First, however, it would be necessary to secure his release from the WEP organization. The party will be composed of the key pipe-line operating executives and engineers, representing the oil companies with production or prospective reserves along the Persian Gulf and the PRC.

E. Holley Poe, executive officer and general manager of PRC, who is negotiating specific contracts with operating companies in the Middle East on the Persian Gulf to Mediterranean pipe line

There was some speculation that an operating company will be organized by the producing concerns in the Middle East to function as an independent corporation, similar to the organizational setup of War Emergency Pipelines, Inc. The new company, if one is organized, would handle the engineering design and construction functions for the Government and probably would be retained as the operating and maintenance agency.

The crude-oil line, first materials for which are planned for delivery this summer, will run from Arabian and Kuwait fields on the Persian Gulf to Haifa or Jaffa, on the Mediterranean coast of Palestine. An earlier alternative of building a spur line to Alexandria, Egypt, is understood to have been abandoned. Cost of the 1,250-mile line is estimated at $130,000,000 and that construction would require 18 months. The line may be buried for its entire length, a deviation from previous pipe-line practice in the Middle East, in order to eliminate soil corrosion. The buried line would also avoid trouble with crawling which results from expansion and contraction with wide fluctuations in temperature experienced in that area.

There were a number of developments as a result of the announcement that the U. S. Government, through PRC, would finance and own a pipe line across Saudi Arabia from the Persian Gulf to the Mediterranean.

The State Department announced that discussions with the British Government concerning the entire world-oil situation would begin soon, with the Russian Government probably included in later discussions. A comprehensive announcement by the State Department covering this subject was promised for the near future. The basis for these discussions was laid some time ago. From the reaction in London, it appeared that the pipeline deal came as a complete surprise to the British.

The PRC proposal was discussed on the floor of the Senate, where Sen. Ralph O. Brewster of Maine urged the creation of a special Sen-

ate committee to formulate a national foreign-oil policy. He questioned the right of PRC to make a commitment of this sort without first obtaining the approval of Congress and authority for the appropriations required. He announced that the Truman committee, of which he is a member, had already released a report on foreign-oil policies, and he was critical of the fact that when Ickes appeared before this committee in executive session he spoke of plans for obtaining more British oil for use by this country whereas the PRC plan is designed to draw on reserves controlled by the United States companies.

President Roosevelt discussed the subject in answer to questions at his press conference but failed to throw any light on the forthcoming British discussions. His chief comment was that we appear to be running short of oil in this country and that it is desirable to make sure of obtaining supplies elsewhere.

Legal and technical representatives of the three oil companies involved have been in daily consultation with the PRC drafting contract forms and discussing details of pipe-line location and construction.

Refinery Location Necessary

A location must also be found for a refinery at the terminus for while PRC officials say they have no interest in any plans the companies may have for refineries, it is a logical inference that most of the oil delivered by the pipe line would be refined at its Mediterranean end for distribution in that part of the world. Some of the crude might be transported by tanker to European refineries, but if the Government elects to take delivery of the 30,000,000 bbl. per year to which it is entitled it would have to make arrangements to have it refined and would hardly be expected to approve of an arrangement whereby its oil would be refined in Europe. One suggestion is that the Government may have to arrange for a "treaty port" where it could control the area for terminus of the pipe line, refinery, storage, and harbor facilities.

The agreement between PRC and the three United States companies permits the Government to take an average of 30,000,000 bbl. of crude annually from its reserve "for the military forces." It is understood that the Army and Navy have no present plans for utilizing this oil as soon as it becomes available, which probably would be at least 2 years hence, but that they view the deal as a reserve against future contingencies. According to this view the Government might not draw on its reserve for a generation, but the military services feel that the project is good insurance even if the reserve is not touched for 50 years.

Truman Report States Objectives

ANOTHER reason in this decision on the part of Senate leaders was the fact that the Truman committee has completed its report on petroleum matters, the first of a series of investigations concerning overseas operations relating to national defense. This report, issued for publication February 16, strongly urged the immediate formulation of a national foreign-oil policy by Congress, in cooperation with the oil industry and with all government agencies.

In its conclusions the Truman committee said:

"The committee is very strongly and unanimously of the opinion that the Senate should give immediate consideration through the appropriate legislative committees to the determination of a petroleum policy for the United States that shall take properly into account both the domestic and foreign field and critical importance of petroleum in our national defense as well as our national wellbeing.

"The security of the United States today is dependent upon adequate supplies of petroleum. The economy of the United States is also to a large extent dependent upon petroleum.

"Failure to make adequate provision for petroleum supplies for the United States during the next few decades will vitally affect both our security and our development.

"The critical importance of petroleum in the world economy is emphasized in the current emergency. There have been suggestions that international arrangements may be considered assuring the access of all nations to petroleum reserves for their peacetime economy upon an equitable basis.

"Such a possibility accentuates the imperative necessity of an early determination of a national policy on petroleum by Congress.

"As preliminary discussions on petroleum policy are held between our government and the governments of our allies, there is urgent necessity for the executive agencies of our government to keep appropriate congressional committees thoroughly acquainted with developments as they take place. A heavy responsibility for consideration and final approval of this nation's petroleum policy rests upon the Congress of the United States.

Burt E. Hull, president of The Texas Pipe Line Co., and vice president and general manager of the War Emergency Pipelines, Inc., may head a reconnaissance party leaving next month for the Middle East

Future Security at Stake

"In arriving at policy decisions of such magnitude that they will affect our future security for decades to come, both the legislative and executive branches of our government should seek the practical counsel and advice of business men in the oil industry, particularly those with foreign experience. Their enterprise has helped to bring us this close to victory, and their judgments can be considered with profit to the national interest before final decisions are reached."

The Truman committee report was based largely on observations of the five world-circling senators, of whom two were members of this committee, and all of whom were critical of the extent to which petroleum needs of the Allies are being supplied from continental United States. The reports of all five were published as a part of this report. In addition, the committee held executive sessions with Ickes and other government officials on the foreign oil problem, and the report includes a lengthy memorandum from the State Department describing American oil holdings abroad.

Because the foreign petroleum matter is of such importance, the report declared, it should receive the immediate attention of the Senate.

Discussing the reserve, production, and demand situation within the United States, the committee said production will fall below requirements the latter part of this year, and added "if it were decided to increase the price of petroleum and petroleum products, we might reasonably expect to discover additional reserves."

"The depletion of our petroleum resources does not present the possibility of an immediate catastrophe,"

the report said, "because fortunately we have, beyond doubt, sufficient petroleum to win this war. Such depletion does, however, present serious problems that require immediate attention and intelligent action in order to assure in the future our national safety and a continuation of our industrial progress."

An analysis of world-oil production and reserves, the report says, shows the importance to the United States of assuring access to some of the petroleum resources of the Eastern Hemisphrere, and continues:

"Although private American enterprise is responsible for discovering these rich resources (in the Persian Gulf region), relatively unprotected by American diplomacy, it is operating in an area where the British influence has been and still is considered paramount. American companies are not dealing with private interests but with the governments of the countries involved. They are competing either with the British government itself or with companies working in close association with the British government. The success of the British interests in dominating this area to date is strong evidence of the inferior bargaining and negotiating positions of the relatively unprotected American interests.

"It is therefore necessary for the United States to evolve a detailed policy for the exploration and development of foreign oil resources."

Four Possible Solutions

The committee said there are at least four solutions to the problem:

1. Leaving private American companies free to take whatever action they can with government assistance limited to only to normal diplomatic channels.

2. Full diplomatic backing for American enterprise in exploring and developing foreign petroleum reserves.

3. Government participation in ownership of concessions.

4. Government ownership of certain foreign oil reserves.

Government ownership can immediately be ruled out, says the committee, as it would presuppose a radical change in our economic system.

Partial government ownership or participation is open to serious objections, the committee report says, but should be given serious consideration because of the difficulties and importance of regulating both domestic and foreign sources of oil. These problems will become more complex if we obtain foreign oil or petroleum reserves through diplomatic action as reverse lend-lease or otherwise, the report notes, adding that it would seem fair to ask our allies, particularly Great Britain, to recompense the United States for its excessive depletion of oil reserves to supply them during the war by transfer to us of a compensating volume of proven reserves outside this country.

"However," the committee adds, "even more important is an agreement with our allies on the equitable allocation of world reserves of petroleum which will be discovered and proven in the future, plus the formulation of a positive, vigorous American policy on the whole subject."

In commenting on the fact that several executive agencies are concerned with foreign petroleum development without proper coordination under an over-all national policy, the committee mentioned the War Department's Canol project, and added that "the war department's foreign operations have not been limited to a single field, and operations on a large scale and proposals of great significance have been considered without consulting the petroleum administrator.

"This difusion of administrative authority is our present means of approach to as delicate and complex a diplomatic and economic situation as can be found in the world," the report said.

"In travelling through the Middle East our subcommittee was impressed with the lack of coordinated and sufficiently responsible displomatic and economic representation."

As a result of its protests, the committee said, the State Department sent James M. Landis to the Middle East with instructions to go fully into this situation, but he found his authority was too limited and was obliged to return to this country for a clarification of authority and policy, emphasizing the need for congress to declare a national oil policy immediately.

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Butadiene Output Hitting Stride

WASHINGTON, D. C.—Replying to criticism of the petroleum-cracking method of making butadiene for the synthetic-rubber program, Bradley E. Dewey, rubber director, declared last week that the quantity of butadiene produced from petroleum will eventually exceed current alcohol production records. When high-octane gasoline demand begins to level off, and all of the crude oil units have been completed, the director said, petroleum butadiene production will be stepped up.

At present this is impossible, not only because of the lag in plant completions but because of a shortage of butylenes used in both 100-octane and butadiene production. The petroleum plants can operate at their originally rated capacity but not at a higher speed, as the alcohol plants are now doing, until more of these butylenes ar available, according to Dewey.

That there are no major "bugs" in the petroleum process is shown by the fact that rubber produced from alcohol and that produced from petroleum are identical as to quality and purity, the director said. Minor breakdowns have occurred in the oil plants owing to use of second-hand equipment and the need for revamping original production systems. Most of these difficulties have been corrected.

About 53 per cent of the 1944 butadiene output called for by the synthetic rubber program will be made from an alcohol base because of late completion and lower production capacity of petroleum process plants.

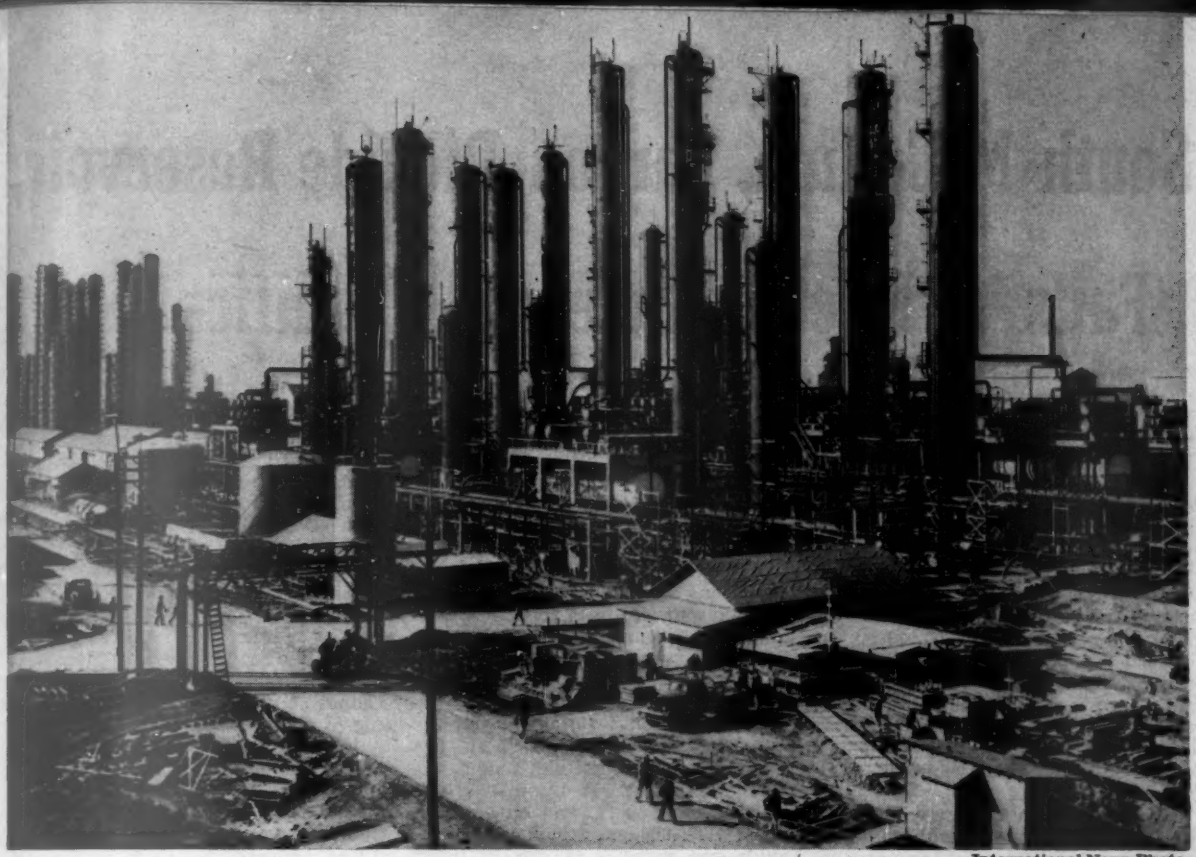
Dewey announced that production of synthetic rubbers during January totaled alomst 50,000 tons. He pointed out that though this had permitted the rubber-manufacturing industry to step up its rate of output, the military and essential civilian truck and bus requirements will, for many months, eat up the monthly increase that will gradually bring the production for the second half of the year to 75,000 tons per month.

There are no definite plans at present to increase butadiene production from some other type of raw material base, but the director admitted his office was aware of another process and thought it to be "pretty hot."

Natural-Rubber Imports Exceed Earlier Forecasts

WASHINGTON, D. C.—The amount of natural rubber imported into the United States during 1943 was practically double the imports of the previous year, Rubber Development Corp. reports. From about 14,500 tons of rubber received from Latin America in 1942 receipts from those countries in 1943 jumped to an estimated 26,400 (long) tons.

In addition, Brazil is making available the rubber for tires and tubes to the extent of 33,000 tons for 1943. These amounts total more than half the entire natural rubber income of the United States, which amounted to 51,000 long tons during the first 10 months of 1943, or an estimated 61,250 tons for the year.



International News Photo

Final stages of construction on the Neches Butane Products Co.'s 100,000-ton butadiene plant at Port Neches, Tex., part of which will be formally dedicated to war service next week. Tallest towers are as high as a 17-story building

THIS WEEK

INTERNATIONAL—Much wider base established for congressional investigation of foreign-oil operations. . . . Congressional and administrative leaders hope to evolve permanent and specific policy. . . . Change in plans consolidates separate congressional investigations, delays probe before Johnson committee on Brewster-Moore resolution calling for liquidation of PRC. . . . ¶Reconnaissance party being organized to study Arabian pipe-line route on the ground—Burt E. Hull may head government representatives. . . . ¶Truman committee issues report on world-oil study, making strong recommendation for unified policy, consolidation of interests and objectives of government and industry. . . . Risks emphasized in depending on strength of private companies in diplomatic negotiations with foreign producing countries which are under British domination. . . . Hint is scarcely concealed that private American companies are in poor position to negotiate against British diplomacy, or against British Government dominated enterprises. . . .

REFINING—Butadiene-from-petroleum process defended by Bradley E. Dewey, rubber director. . . . Unavoidable delays in obtaining equipment blamed for apparent lag of petroleum phase of program. . . . Largest butadiene unit to operate on petroleum hydrocarbons will be dedicated at Port Neches, Tex., February 23. . . .

DRILLING—E. O. Thompson, Texas railroad commissioner, launches campaign to retrieve state control over well spacing. . . Declares greater availability of materials eliminates Government's only reason for federal regulation of this phase of operations. . . . ¶Completions for 6 weeks total 2,042, up 18 per cent from last year. . . . Less than 56 per cent of current completions are oil producers, rest are gas wells and dry holes. . . . ¶Deep exploration started in west-central part of Dominican Republic, near Haitian border. . . .

PRODUCTION—Slight increase of 17,170 bbl. reported for week, leaving output still a little shy of PAW's February quota figures. . . . ¶March nominations of Texas purchasers may be reduced, because tank cars are not available for meeting shipping schedules. . . .

SUPPLIES—Distribution and Supply Division organized by PAW to consolidate separate branches, correlate these related functions. . . . ¶Stocks of all oils on Pacific Coast being liquidated at rate exceeding 150,000 bbl. daily, shortening the crisis period. . . . ¶Stocks of certain oils backing up on Gulf Coast because tankers have been diverted to other services without compensating return of tank cars. . . . ¶Inadequate rail facilities prevent shipment of more than few cars a day from District 3 to District 2 refineries. . . .

South McCallum, Carbon Dioxide Reservoir, Fails to Meet Commercial Qualifications

DENVER, Colo.—Continental Oil Co. has completed and shut in its 4-A Hoye, on the South McCallum dome, Jackson County, northern Colorado, an operation which involved several unusual and interesting features. The well is in the NE NE SW 27-9n-78w, ⅛ mile southwest of the discovery well on the south dome, which was completed in 1928 at 4,875 ft. for an initial production of 50,000,000 cu. ft. of carbon dioxide gas with a few barrels of high-gravity oil testing 45.8° A.P.I. gravity. The dome lies immediately southeast of North McCallum, on which the first discovery was made of the so-called "ice cream" wells at an earlier date.

The name given to these wells arose out of the performance of the gas and oil when the sand was encountered. The gas, upon being released, began to expand as it started up the casing and, through condensation, registered a temperature of 110° F. below zero by the time it reached the surface. Compression during the mile journey to the casinghead caused the gas to liquefy and, with the oil, came out in the form of a light-colored mush somewhat resembling ice cream.

Drilling Difficulties

The drilling of these wells involved numerous and difficult problems. Producing them was equally perplexing. Heat, for example, had to be applied, but alternate expansion and contraction put a heavy load on the casing and the smallest leak in the pipe from this strain might produce disastrous results. Grief marked the earlier development on the north dome, but through experimentation and the application of the most scientific principals, the operator has overcome most of the problems and last fall 5 Pollock was completed on the north dome without the well once getting out of control or causing any unusual difficulties. It tested 192 bbl. of oil and 10,000,000 cu. ft. of carbon dioxide gas. Experiments had shown that the oil was in the gas rather than the gas being in the oil. The cores, which ordinarily would have come out bleeding, failed to show any oil. It had disappeared into the gas. The 7-in. casing was cemented below the sand and perforated by stages in order to hold down the pressure to the desired point. In this manner the oil was held in place and released into the casing with a minimum of gas pressure. Through experimentation and the working out of methods applicable to the immediate problem, the operator is now convinced that the north dome can be commercially developed. However, the south dome remained an unknown possibility, although it had shown a little oil with the gas under conditions similar to those found on the other structure. It was decided to make a thorough test which would determine whether it could be made a commercial field, and in October 1942 4-A Hoye was spudded.

It was drilled to 5,708 ft., and the 7-in. was cemented at 5,695 ft. The first test was in the Lakota sand, the casing being perforated with 475 holes at 5,555 to 5,650 ft., and on a test it made 7,000,000 cu. ft. of carbon dioxide gas and 8¾ bbl. of oil in 22 hours. A retainer then was cemented to shut off the lower sand and the casing was perforated at 5,520-45 ft. opposite the second Dakota with 125 holes. On a 19-hour test it made 6,421,000 cu. ft. of gas and 5 bbl. of oil. The first Dakota then was tested through 350 holes at 5,420-90 ft., and in 20 hours made 4,640,000 cu. ft. of gas and 11¼ bbl. of oil. It then backed up to the second Frontier and perforated with 100 holes at 4,390 to 4,410 ft., and on a test showed no oil or gas. The first Frontier was tested through 475 holes at 4,290 to 4,375 ft. and swabbed dry, neither oil or gas showing. The hole then was filled with mud to the surface and shut in.

In determining the commercial possibilities of these carbon dioxide wells, several unusual factors, especially the expense involved, have to be taken into consideration. In the first place, the customary drill-stem tests are impossible. Steam heat has to be injected to offset the gas expansion and cooling process. This requires two oilfield boilers to produce sufficient heat to counteract the freezing. The gas cannot be used for fuel and the burning of oil would result in unwarranted waste. The only recourse is to use coal which has to be moved into the field. In order to separate the oil and gas, the product has to be run through high and low-pressure separators.

The operator, in order to make a thorough and scientific test of the possibilities of the south dome, employed all of the facilities required, built the heating plant, installed the separators, and expended on the operation a sum sufficient to drill and complete three or four ordinary wells to that depth in more normal fields. At the conclusion of the test, the opinion was reached that the south field is not commercial, but that the north field, through the application of the scientific methods developed during the period of experimentation, is commercial and the company will go ahead with its development.

Lion Oil Refining Co. Projects Deep Test in Western Nova Scotia

DRILLING operations are to start early this spring on Lion Oil Refining Co.'s exploratory well southwest of Mabou, Cape Breton Island, Nova Scotia, following up extensive geological mapping of surface conditions which was supplemented by a geophysical survey in 1942.

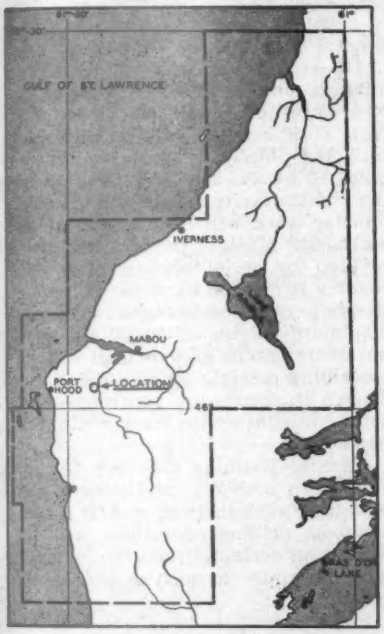
Decision of Lion Oil Refining Co. to extend its operations beyond domestic borders is a continuation of the trend among other individual oil companies. Developments of recent weeks confirm assertions of oil men that the private components of the industry are thoroughly qualified to carry American representation into every potential oil-producing country without direct government participation. The current trend of expansion into potentially productive oil regions outside this country is made more significant by inclusion of interests which heretofore have restricted their operations to domestic territory.

Location selected for drilling by Lion is about 100 miles east of the joint wildcat test currently under way by Cities Service Co. and Soc-

ony-Vacuum Oil Co., Inc., in the open water of Hillsborough Bay, 8 miles south of Charlottetown, capital of Prince Edward Island.

The Lion concession includes 11 licenses, covering 981 square miles in Inverness County, Cape Breton Island. The concession was obtained from Cape Breton Petroleum Co., a Boston corporation, which retained an interest in the properties.

Surface beds on the concession consist of sands, shale and limestones of Pennsylvanian and Mississippian age and basement complex of Devonian and pre-Devonian beds. Lion's test well is projected to 4,600 ft., which is expected to explore the Ainslie sandstone of the Horton formation as the principal objective. Section to be penetrated by the well consists of approximately 3,000 ft. of shale, limestones and gypsum of Upper Windsor formation and approximately 1,100 ft. of Horton, both of Mississippian age.



Western portion of Cape Breton Island, Nova Scotia, showing location for Lion Oil Refining Co.'s test well which will be started this spring

Naval Office Will Expedite Aviation-Gasoline Output

HOUSTON, Tex.—A naval office to expedite construction of Texas plants designed to produce 100-octane gasoline will be opened in this city March 1. The new office, directed by Rear Adml. Norman Murray Smith, retired, will be under the jurisdiction of Rear Adml. J. T. Mathews, superintending civil engineer for Naval Area No. 4, covering nine southern states, with headquarters in New Orleans.

Pew Refutes Pearson Assertion That Sun Favors Low Crude Price

PHILADELPHIA, Pa.—J. Howard Pew, president of Sun Oil Co., this week released for publication text of a letter to Drew Pearson, Washington columnist, regarding the crude-oil price situation which follows:

"Your column of February 10 from Wichita Falls, Tex., has been brought to my attention. This column gives the impression that I have been opposed to a price increase for crude oil. Nothing could be farther from the truth, for I have unequivocally supported the fight to raise the present unfair price ceiling on petroleum and its products.

"You have undertaken to create this impression by stating: Howard Pew, of Sun Oil, testifying at a hearing in Washington, frankly admitted: 'I am very keen on getting the cost of crude oil down as low as possible.' This quotation was torn from its context in testimony which I gave as a spokesman for the American Petroleum Institute before the Temporary National Economic Committee on September 26, 1939. My tesimony on that occasion, more than 4 years and 4 months ago, when an entirely different situation existed in the industry than exists today, obviously, had nothing whatsoever to do with the present price situation in regard to petroleum and its products. Moreover, I was not discussing prices at that time, but rather 'costs of crude oil.' There is a distinction between costs and prices, for the fairness of the price of a commodity can be judged only upon the cost of producing and marketing the commodity.

"I have been a life-long advocate of doing everything possible to reduce the costs of producing, refining and marketing crude oil in order that finished products can be sold to the consumer at lower prices. But I have never advocated the reduction of a price below the cost of production plus a reasonable profit. At the hearing cited in your column, and recorded upon the same page of the printed hearings as the statement which you quoted, I pointed out that crude oil production was an unprofitable operation at that time.

"For many months I have supported the movement within the petroleum industry to persuade the Office of Price Administration and the director of economic stabilization of the urgent necessity of raising the price of crude oil so the industry might fulfill its obligation to produce sufficient oil to meet the needs of the war program. As a member of the Petroleum Industry War Council, I voted last November for that body's resolution criticizing the failure of the Office of Price Administration and Office of Economic Stabilization to permit a price increase for petroleum and praising the efforts of Petroleum Administrator for War Ickes in seeking to obtain an increased price.

"I have set forth in some detail my reasons for advocating an increase in crude-oil prices in the annual report of the Sun Oil Co., now in the hands of the printer, which will be published within a few days. I shall see that a copy of this report is sent to you and what I have said there should convince you of the erroneous impression given by your column."

Tanker Construction Quadrupled in 1943

NEW YORK.—Construction of tank vessels in 1943 was at a rate almost four times greater than in 1942, totaling 231 vessels of 2,162,624 gross tons and 3,420,405 deadweight tons, J. Lewis Luckenbach, president of American Bureau of Shipping, reported at the bureau's annual meeting last week. "Of this number, 167 were of the large seagoing type, 57 were of the converted emergency Liberty ship type and seven were of special design for the Venezuela-Aruba service.

"Almost all the contracts for construction of tankers for private interests were completed during the year, these totaling 15. Turboelectric-drive propulsion machinery is successfully employed in 136 of the new tankers. Propulsion machinery totaling 1,426,730 hp. was constructed for these 231 new tankers."

The Texas Co. Acquires Oil Leases in Three States

HENDERSON, Ky.—Assignments recorded here reveal that The Texas Co. has acquired mineral rights involving $1,390,000 in Kentucky, Illinois, and Indiana.

The lands include eight tracts in the Burbank lease, in the Smith Mills section, totaling 320 acres; another of 65 acres in the same field, and a section described as Lot 4, W. P. Cooper lease, all of Henderson County.

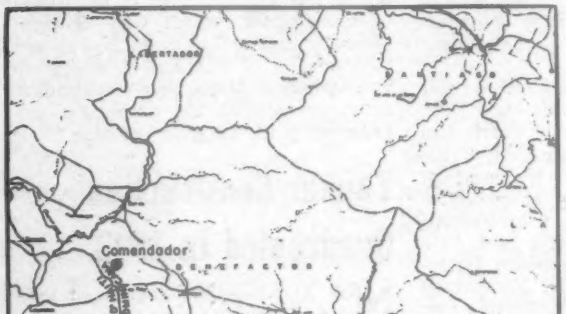
A total of 336.25 acres lie in Union County, Kentucky, and in Wabash and White counties, Illinois.

Deep Drilling Planned in Dominican Republic Area

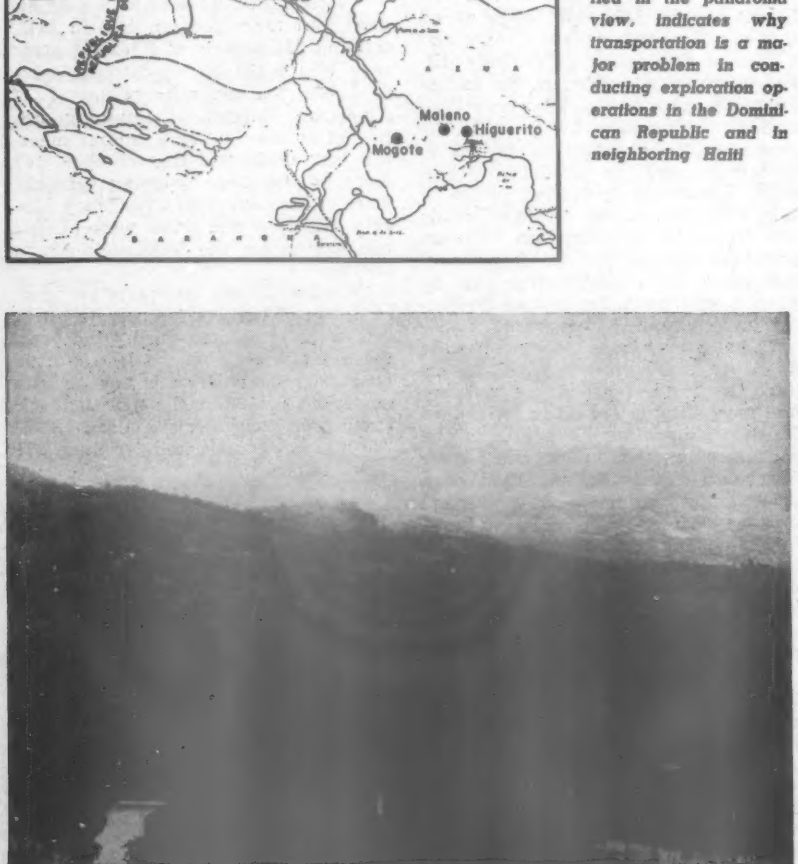
SEABOARD DOMINICANA, a partnership company under supervision of Standard Oil Co. (New Jersey), is moving a heavy-duty rotary steam rig to the west central part of the Dominican Republic where 1 Comendador will be drilled as a deep test near the Haitian border. The rig was originally used in the Dominican Republic by Allen & Morris, San Antonio, Tex., contracting firm, in drilling two deep wells, 1 El Mogote and 2 Maleno, in the southwestern part of the republic before Standard of New Jersey acquired an interest in Seaboard Dominicana from Seaboard Oil Co. of Delaware and others.

Since promulgation of the new petroleum law for the Dominican Republic in April 1942, Seaboard Dominicana has drilled six wells on the Maleno and Higuerito anticlines in the southwestern part of the republic, approximately 15 miles northwest of Azua. All of the exploratory wells, Nos. 2 to 6 Maleno and 1 Higuerito, were relatively shallow, each being less than 3,000 ft., and were failures, although some oil was found in a few of the holes.

All except 2 Maleno were drilled with a light diesel rig which is now drilling 2 Higuerito at around 2,100 ft. Operators plan continued use of the light rig to test various prospects and to obtain additional subsurface information.



Areas of previous exploration and the new Comendador location are spotted on this map showing the west central portion of the Dominican Republic. Rugged terrain and tropical vegitation, typified in the panaroma view, indicates why transportation is a major problem in conducting exploration operations in the Dominican Republic and in neighboring Haiti



One Deep Well Drilled

The deepest well yet drilled, 1 El Mogote, was abandoned at 7,505 ft.

The heavy rig has not been active since 1940, chiefly because of transportation difficulties. After completing 1 Comendador, the company plans to drill other deep tests in the same general area.

All exploratory work on the Dominican concessions which were originally acquired by Harold C. Bishop, New York independent operator, has consisted chiefly of geological mapping. However, the operators advise that both gravity meter and magnetometer work will be initiated at an early date. Much of the area has been covered by aerial photography. The country is marked by three east-west trending mountain ranges, attaining maximum heights of 10,000 ft., with the intermontane geosynclinal valleys containing possible oil accumulations. Known structures are generally elongated anticlines with steeply dipping flanks.

Atlantic Refining Co. and Bishop have been active in preliminary exploratory work in Haiti and, it is understood, drilling operations will be started on certain structural features in that country as soon as conditions permit.

Senate Committee Asked to Hear Oil-Price Testimony

WASHINGTON, D. C. — Requests for hearings on the Disney bill to increase the ceiling price of crude petroleum are being made to the Senate committee on banking and currency, but so far Chairman Robert F. Wagner has not set a date for consideration of the measure.

Senators Tom Connally of Texas and Elmer Thomas of Oklahoma are among those filing written requests for a hearing, pointing out that Secretary Ickes and various groups in the oil industry have supported a price increase as is provided in the measure which passed the House in December.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Mississippi's Responsibility

THE entire citizenship of Mississippi as well as its oil industry should give full support to the plans to enact conservation laws which will assure an efficient and long-range development of the state's petroleum resources. Discoveries to date and accumulated geological knowledge point to further petroleum expansion in that state.

Just what this future development will mean to the economy of Mississippi and the oil industry generally will depend on the regulatory practices adopted. Furthermore, the entire Southeast shares in the favorable oil outlook, and what is done in Mississippi in the enactment of adequate conservation laws will greatly influence the action of other states in that large potential oil area.

Mississippi does not need to look outside its own boundaries to see the results of operations which did not follow accepted conservation practices. Its Tinsley pool, opened in 1939, has proved to be one of the few major discoveries in recent years. With little control over its exploitation the field has already produced more than 60 per cent of its 103-million-barrel reserve. At the 1943 rate of production the remaining reserve will be depleted in less than 3 years.

The situation in Illinois is a large-scale exhibit of what happens when a state encourages the development of its oil resources without proper regard for physical and economic waste. Discoveries in 1937 and since have tapped pools representing proven reserves totaling about 1 billion barrels.

Located in the center of a large consuming territory, the state had every advantage in the development of its newly discovered wealth. But its officials listened to the minority, who inaccurately insisted that conservation methods injure the "little fellow." Illinois wanted its new oil quickly and got it without regard to other areas.

Now that state has the results of its folly. Only 30 per cent of its total reserves remains, and the ratio of reserves to production at the start of this year was 5.3 to 1. The state established the rules or lack of them, and the oil industry had no choice but to operate accordingly.

A large refining industry could have been built. Permanent headquarters for large and small operators could have been established, with trained and well-paid personnel which would have been part of the community life in the Illinois Basin for many years. The entire state would have shared in the numerous contributions that petroleum can make to economic growth. This is no criticism of the Illinois Geological Survey, which has done a good job in administering what conservation provisions the state has.

Unfortunately, the unfavorable reactions in petroleum operations which do not conform to conservation rules are not confined to the immediate area. Had Illinois not produced 15 per cent of its new reserve in 1940, with a 95-million-barrel production the previous year, the petroleum industry of this country would have entered the war on a more favorable price and operating basis than it did. The crude oil that should have remained in the ground during those 2 years would have been a major contribution in relieving recent shortages.

In this instance, as in all others that have preceded it, the nation and this industry paid a high price for petroleum not produced in conformity with proven practices. Mississippi and all the oil states must do whatever remains to be done in presenting a solid conservation front.

Standard Promotes Three Employes

THREE executives in the exploration department of Stanolind Oil & Gas Co., Tulsa, were promoted last week to positions of greater responsibility.

A. L. Solliday, formerly manager of the exploration department, was elected vice president in charge of operations and became a director of the company.

George W. Clarke, assistant manager of the exploration department, was promoted to succeed Solliday as manager and J. G. Bartram, geologist on the general office exploration staff since May 1942, and formerly division geologist becomes assistant manager of the exploration department.

All promotions became effective February 8, it was announced by F. O. Prior, president of Stanolind.

Solliday was first employed by the old Dixie Oil Co. in 1923 and served with that concern until it became part of the Stanolind company in 1931. Then he became manager of the land department for the continuing company. He became manager of the exploration department in 1932 and served in that capacity until his promotion to a vice presidency and directorship last week.

Clarke also served with the old Dixie company as district land man from 1925 to 1927. He operated independently and in conjunction with The Oklahoma Co. from 1927 to January 1932. He became manager of Stanolind's land department in 1932 and was promoted to assistant manager of the exploration department in September 1941.

Bartram was a geologist with Roxana Petroleum Corp. from 1916 to 1923 and in that year he accepted a position with Midwest Refining Co. in the Rocky Mountain region. When Midwest was merged with Stanolind in 1932, Bartram continued in the Rocky Mountain geological department until 1938. He then became central division geologist at Tulsa, handling Oklahoma, Kansas, North Louisiana, Mississippi and Arkansas. In May 1942 Bartram was transferred to the general office geological staff.

Supply and Transportation Combined in One Division

WASHINGTON, D. C.—Supply and transportation of oil and its products within the province of Petroleum Administration for War have been combined in a new Supply and Transportation Division, and all distribution activities assigned to an expanded Distribution and Marketing Division. This makes the Supply and Transportation Division responsible for the movement of all available stocks of both crude oil and petroleum products from supply areas to refineries and from refineries to distribution areas so as to assure the most effective disposition of stocks.

Functions of the present Marketing Division are expanded to include officially the responsibility for distribution of available products from supply terminals to distributors and consumers. Many of these functions have been performed by the Marketing Division for some time. The move is accompanied by a similar shift in the five PAW district offices, and by a corresponding realignment, now under way, with respect to the several district industry advisory committees concerned.

Director of the new Supply and Transportation Division is George A. Wilson, who has been director of PAW's Transportation Division. Walter Hochuli, director of the Marketing Division since March 31, 1943, will continue as director of the Distribution and Marketing Division.

Oil Industry Outlay for War Plants Being Surveyed

WASHINGTON, D. C.—The Petroleum Industry War Council is canvassing the oil industry to ascertain the total amount of capital expenditures exclusive of federal financing, made by individual oil companies directly in furtherance of the war effort.

This canvass is being conducted, William R. Boyd, Jr., chairman, explained, to clarify a popular misconception that government funds have entirely underwritten new construction and expansion of the petroleum industry's wartime facilities.

Based on a census of capital expenditures made a year ago, PIWC disclosed that an estimated outlay of $673,011,055.75 in private funds was then anticipated by individual oil companies in petroleum war programs which, under normal circumstances, would not have been undertaken.

This sum, entirely exclusive of any government investments, reflects the capital expenditures made or then contemplated by the reporting oil companies.

Specifically, the PIWC compilation showed, the estimated $673,011,055.75 expenditure of the reporting companies was channeled into war-born refining expenses of $512,864,695.71, another $136,661,759.52 into transportation and $23,484,550.52 into accelerated distribution facilities.

The PIWC chairman contended that since conclusion of the last census of the oil industry's war-necessitated capital expenditures, a number of new projects and additions to existing plants and facilities to increase further the output of petroleum products for war have been authorized and initiated.

"It has been found also in a number of instances that the final construction cost on new 100-octane and plants to produce raw materials for synthetic rubber will be considerably different than as first estimated, requiring added private expenditures by individual oil companies," Chairman Boyd continued.

Letters:

PAW Asked to Return Well-Spacing Control

Dear Sirs:

It seems to me that PAW should now desist from further rule making as to spacing of oil and gas wells and the making of rules of production since steel is now becoming more available.

Their only reason for rules was to conserve material. They should not endeavor to set up a super-duper oil and gas conservation commission just on a basis of pipe shortage when the shortage is clearing up.

The only legal spacing rules (except on public and Indian lands) are those set up by the states so let's get back to legal conservation by returning all spacing and field rules and development plans (except on public and Indian lands) to the proper state jurisdictions.

If we don't look out federal encroachment on state law will get so thoroughly entrenched that we will never break up this new war-emergency-pipe-shortage-basis-established bureau.

The states can handle and have handled it well all the time and there is no longer any excuse to keep up this phase of PAW activity.

All along it has been said that PAW would be self liquidating. Now here is a real opportunity to liquidate a part of its unnecessary and nuisance red tape.

In Illinois the PAW has permitted closer spacing than anywhere, so where is their saving of steel?

Fact is its time to begin closing down the unnecessary and uneconomic parts of this useless duplication.

We are furnishing the oil as called for as needed.

The operators should not have to present their applications to drill to the state agency and then to PAW if they have the steel. As the matter stands PAW is just an extra pressing of a suit before wearing it.

Sincerely yours,

ERNEST O. THOMPSON.

Member Railroad Commission of Texas.

Wildcat Drilling Has Failed to Keep Up With Increasing Need of Discoveries

*by W. V. Howard**

Records show that there has been an apparent increase in wildcatting since 1937 despite a stationary price for crude oil. These records are not confirmed by the National Oil Scouts and Landmen's Association which shows no increase, except in newly developed areas. Upon analysis, all of the apparent increase seems due to changes in the definition of the term "wildcat" and except for newly opened areas, wildcatting has not increased since 1937 when reserves of oil were nearly 3,000,000,000 bbl. higher than now and production was 15 per cent less than current rates.

ORDINARILY it would be considered that among the easiest trends to determine are those on discovery and wildcat drilling. Actually, these are two of the most difficult to plot. After 85 years of wildcat drilling, it has proved impossible to define the term.

On January 31 and February 1 of this year, a committee met in Washington to agree on the definition of such terms as "wildcat," "extension" and others and after 2 days' discussion failed to reach a conclusion.

First, as head of a group of geologists studying wildcat trends and later as chairman of the subcommittee on exploration, District 3, Dr. F. H. Lahee has been conducting surveys of wildcatting since 1935. In 1938 Dr. Lahee and his committee defined wildcats as follows: "... Holes drilled sufficiently far from developed production to be a test of unknown subsurface conditions. We do not include short extensions of pools or any holes located within the boundaries of pools, unless . . . drilled to explore untested possibilities distinctly deeper than the known horizons."

Later Classification

In 1939, it was stated that wildcats were generally 2 or 3 miles from production, except that in some cases, notably in association with salt domes, a wildcat might be much closer. Discoveries of deeper sands were excluded on structure but included if on the flanks or if very few wells had been drilled.

In 1941, lensing sands were added to the categories which might place the distance of a wildcat from production as little as ½ to ¾ mile.

In his report to PAW, Dr. Lahee subdivides exploratory wells into three classes: a wildcat drilled outside the limits of a pool for the purpose of locating a new one; a "pool wildcat," drilled for the purpose of locating a deeper pay; and an "outpost well," drilled to extend a pool, although the well itself is not thought likely to be an edge well. It was Dr. Lahee's idea that an exploratory well should be classified as such before drilling starts.

The Washington office of the Petroleum Administration for War countered with the proposal that an outpost well should be classed as a development well and the term "pool wildcat" should be replaced by "new-pay test" as discoveries of new pays above as well as below known pays would result from such tests.

The A.I.M.E. and the National Oil Scouts and Landmen's Association have also collected data on wildcat or exploratory drilling but they also appear to have reached no conclusion as to what is a wildcat. Some reports exclude outposts or extension wells; others include them but exclude tests of new sands, and still others appear to follow more or less closely Dr. Lahee's 1941 definition. In listing wildcats there is also little uniformity. Some reports distinguish between "rank" wildcats and others. Similar reports distinguish between "important" wildcats and others. Meanwhile, as the reporting personnel changes, each lists those wildcats which he considers to be such, and tabulations made in previous years are not modified to meet the new definition.

Fig. 1 shows the trends of certain areas as reported by the three report-

WILDCAT DRILLING IN THE UNITED STATES

	1937	1938	1939	1940	1941	1942	1943
GROUP A—Areas With No Outstanding Discoveries							
Coastal Texas	634	700	720	647	616	608	581
Oklahoma	174	124	112	185	248	254	310
Michigan	90	197	374	354	231	216	158
Kansas	223	172	95	145	227	330	485
New Mexico	77	43	25	39	43	40	39
Rocky Mountain states	34	20	20	16	26	31	48
Texas Panhandle	9	12	12	7	7	3	2
Total	1,241	1,268	1,358	1,393	1,406	1,482	1,553
Increase over 1937	....	27	117	151	165	241	312
Percentage increase	....	2	9	12	13	19	25
GROUP B—Old Areas With Outstanding Discoveries							
California	150	135	102	104	124	183	167
North Central Texas	208	231	99	286	318	351	480
West Texas	121	124	79	79	147	100	110
East Texas	127	116	127	72	127	138	115
Arkansas	48	33	41	39	40	47	70
Louisiana	142	149	140	174	221	102	139
Total	797	838	588	754	980	981	1,081
Increase over 1937	....	41	—209	—43	183	184	284
Percentage increase	....	5	—26	—5	20	23	36
GROUP C—New Areas							
Illinois	127	377	478	525	591	549	477
Indiana	31	37	103	112	113	122	70
Mississippi	19	13	18	109	52	52	91
Forest City Basin	....	42	28	42	46	52	29
Total	179	469	627	788	802	775	667
Increase over 1937	....	290	448	607	623	596	657
Percentage increase	....	162	250	338	348	333	367
Grand total	2,217	2,575	2,573	2,932	3,188	3,238	3,291
Increase over 1937	....	290	448	607	623	596	478
Percentage increase	....	11	18	32	43	46	49

1943 figures from The Oil and Gas Journal; remainder, F. H. Lahee.

*Consulting geologist, Tulsa.

ing groups, continuously over a period of several years. As new continuous records are introduced, they have been added so as to start another curve. The A.I.M.E. records show an increase from 1939 to 1941 and a decline in 1942. The scouts show little change through the period, while Dr. Lahee and his group show a steady increase from 1937 to 1941 and a small decline in 1942.

It has already been shown that Dr. Lahee's definition of a wildcat has become successively liberalized so that the increase may represent wells added as a result of this liberalization. In other words, had the record of earlier years been amended so as to embrace wells included in 1942 but excluded previously, the curve might show a very different trend.

PAW Exploration Figure

PAW figures for the years 1941-43 show an even greater number of exploratory wells than those of Lahee. This is probably due to the greater area involved. However, it is obvious that the definition PAW has used is about the same as that preferred by Lahee.

The writer's definition of a wildcat and one which The Oil and Gas Journal has followed in recent years is that an exploratory well is one which those familiar with it call a wildcat. This is an unsatisfactory definition, but it appears to be the one generally followed, if not officially adopted.

Not necessarily because it is the most accurate, but because it has covered the largest area for the longest time, Dr. Lahee's record of wildcat drilling has been used in the preparation of the accompany table.

In this table, producing areas have been divided into three categories: those with no outstanding discoveries, those with outstanding discoveries, and new areas. By "outstanding discoveries" is meant fields in new prolific pays such as the Eocene of Coalinga Nose in California, the Jurassic and Lower Cretaceous pays of Arkansas and East Texas, the Ellenburger in North and West Texas or the Wilcox in Louisiana.

Wildcatting in all old areas varies as discoveries open up new possibilities and dies down again as these possibilities are tested. Those areas in Group B accordingly show wilder fluctuations than those in Group A, but the long-term trend is essentially similar.

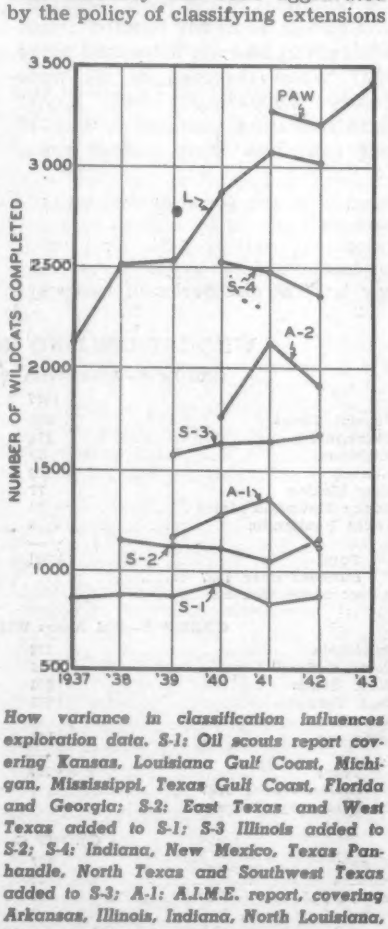
Any area opened to production will naturally have more wildcats after production has been obtained than before. Hence, the areas in Group C all show an increase which at the peak in 1941 accounted for two-thirds of the total rise above the 1937 level for all areas. They still account for 45 per cent of the total rise.

For the old areas, the total increase in wildcats in 1942 over 1937 was 21 per cent. Substituting Journal figures for those of Lahee shows a further increase in 1943, but this may be due entirely to the different basis of defining an exploratory well. In has already been shown that Dr. Lahee's definition of a wildcat well has become considerably liberalized and it is entirely possible that the apparent increase in wildcatting is due to this cause and not to any actual increase.

The question may appear academic but currently the trend of wildcatting is of great commercial importance to oil operators.

One of the main arguments advanced in favor of an increase in the price of crude is that it would stimulate wildcatting. If figures show that wildcatting has already increased without this stimulus, the argument is not convincing. It is unfortunate that the industry has become so "exploration conscious" in recent years that it is calling wells wildcats today which it would have considered development wells a few years ago. This tendency has been aggravated by the policy of classifying extensions as new fields for proration purposes in such states as Kansas.

Although it cannot be definitely proven, a good argument can be advanced for the statement that wildcatting has not increased since 1937 except in areas opened up since that date, despite a rapidly increasing shortage of oil. Confirmatory evidence is furnished by the tabulated records of the National Oil Scouts and Landmen's Association.



How variance in classification influences exploration data. S-1: Oil scouts report covering Kansas, Louisiana Gulf Coast, Michigan, Mississippi, Texas Gulf Coast, Florida and Georgia; S-2: East Texas and West Texas added to S-1; S-3 Illinois added to S-2; S-4: Indiana, New Mexico, Texas Panhandle, North Texas and Southwest Texas added to S-3; A-1: A.I.M.E. report, covering Arkansas, Illinois, Indiana, North Louisiana, Michigan, Mississippi, New Mexico and Tennessee; A-2: A.I.M.E. report, covering Kansas, Oklahoma and Nebraska, added to A-1; L: Lahee report, covering California, New Mexico, Texas, Oklahoma, Kansas, Arkansas, Louisiana, Mississippi, Illinois, Indiana and Michigan; PAW: Total wildcat completions for all states

Diesel Engineers to Meet In Tulsa May 8-10

Featuring a timely and exceptionally interesting technical program, the Seventeenth National Oil and Gas Power Conference will be held at the Mayo Hotel, Tulsa, May 8-10. The meeting is sponsored by the Oil and Gas Power Division of the American Society of Mechanical Engineers.

The tentative program is planned for 3 days. The Monday session will include a paper on current status of the gas turbine and another on recent developments in turbosupercharging. Tuesday's session will center around power-plant design and operation, featuring papers on gas-diesel engines, exhaust systems and pipe-line plant operation and maintenance. Both sessions on Wednesday will be devoted to the problem of engine control and governing. A paper on special problems of govering diesel generators operating in parallel, and one on control of pipeline engines are included.

Plans for inspection trips include a visit to the maintenance shops of one of the large pipe-line companies and possible visits to a bomber assembly plant and an oil refinery.

I.P.A.A. Directors Plan Bradford, Pa., Meeting

The midyear meeting of the board of directors of the Independent Petroleum Association of America will be held in Bradford, Pa., April 27, 28, and 29, Ralph Zook, president, announced Saturday.

At the same time, a joint meeting of the directors of I.P.A.A. and the National Stripper Well Association will be held. J. D. Sandefer, Jr., of Breckenridge, Tex., is head of the stripper well association.

Special emphasis will be placed on field practices in secondary recovery at the Bradford meeting, Zook said. A tour of engineering and core analysis laboratories in the Pennsylvania area to see tests made on sand to determine its susceptibility to water flooding also is planned.

The complete program of the midyear meeting, which will include outstanding national speakers, will be announced soon.

Supply Position on West Coast Continues Critically Serious

LOS ANGELES, Calif.—General conditions in District 5 remain relatively unchanged, the major disparity existing between supply and demand having been temporarily alleviated by reduced driving during the past several weeks. It had been anticipated that OPA would reduce coupon values in the Pacific Coast area when the No. 10 ration stamps became valid January 22 to permit accumulation of gasoline during the period of low consumption, but it was finally decided to allow values to remain unchanged for the time being.

Very few are familiar with the small amount of motor fuel in the Pacific Coast territory that is available for civilian consumption. Statistics published by the A.P.I. and the U. S. Bureau of Mines contain aviation gasoline and other high-test motor fuels which are not available for civilian use. The exact amount, however, is so small that marketers felt obligated last December to begin rationing deliveries to service stations on a pro rata basis of previous business. Service-station operators were told how much gasoline they would be given during the next 30 days and they could determine how to sell it. Some chose to restrict operating hours, others sold whatever was wanted and then closed, while others limited sales to 3 or 5 gal., depending upon what supplemental tickets were held.

Increasing volumes of gasoline for military services must come from current production and stocks on hand. Gasoline sales during the past several months have averaged about 18,000 bbl. per day above the amount allocated to civilians and would still be running above daily quotas had not marketers invoked restrictions on deliveries of gasoline to service stations.

Despite the intensive search for new fields and the concerted attempt to produce every possible barrel of crude, fuel-oil stocks will hit a much lower level within the next 6 months. Imports from the Gulf Coast to California have failed to materialize at the rate promised and unless rail shipments are stepped up in the very near future the approaching crisis will be more severe. Increased liftings in the Mediterranean and Caribbean areas are expected to alleviate market demands on California but those familiar with conditions in foreign areas are of the opinion that the bottleneck is not in production but in refining facilities.

Very little or no improvement can be expected from a production standpoint in California as there are no flush fields that can be opened without endangering future recovery. Discoveries during the past few years have been at a satisfactory numerical rate but the quality, with few exceptions, has been far below requirements. A determined effort will be made to maintain current crude-oil production in California during 1944, and if this program is successful the reduction in reserves will be substantially larger than during 1943 unless compensating discoveries are registered. About 1,500 new wells probably will be drilled in California during 1944, which means that operators must average 125 new wells each month.

Salvage work will continue in California but new equipment, especially pumping units, is badly needed and must be provided if the maximum benefits of new drilling is to be reflected in increased production.

Uinta Basin of Utah and Colorado Subject of Study

"Hydrocarbons of the Uinta Basin of Utah and Colorado" is the title of a study that is reported in the current Quarterly of Colorado School of Mines, Golden, Colo. Under this title are included treatments of two phases of the subject: "Review of Geology and Field Work," by Clark F. Barb, professor of petroleum engineering, and "Survey of Bitumen Analyses and Extraction Methods," by James Ogden Ball, associate professor of petroleum engineering.

Hodges Associate Director Of New Division in PAW

WASHINGTON, D. C.—Dene B. Hodges, New York, manager of transportation and supplies in the Mid-Continent and Atlantic Coast areas for Shell Oil Co., Inc., has been named associate director of Petroleum Administration for War's newly combined Supply and Transportation Division.

Hodges has been actively engaged in the petroleum industry since 1926, when he started as a clerk in the production department of Shell's field office in Ventura, Calif. He had attended University of Nebraska, where he majored in chemistry. In 1929 Shell assigned him to its Martinez refinery, where he spent the next 5 years in product accounting and operating estimates work. In 1934, Hodges joined the staff at San Francisco as administrative assistant in the manufacturing department. During part of 1939 and early 1940 he was executive assistant. In 1940 he joined the New York staff.

DEATHS

J. C. Weathers, 49, salesman for Barnsdall Oil Co., died suddenly February 8 in Tulsa.

George D. Crossley, 72, retired member of Gulf Oil Corp.'s traffic department, died February 7 at his home in Houston, Tex.

Maj. Willard Farrar, geologist for Skelly Oil Co. before he entered war service, was killed December 2, 1943, in New Guinea, where he was in the engineers corps. Major Farrar worked as a geologist in Kansas, Illinois, Kentucky, and Mississippi, and he had been a member of Missouri Geological Survey.

Stephen E. Beveridge, 73, died recently in Calgary, Alta. Going to Alberta in 1887, he was president of Rocky Mountain Oil Fields, the first oil company organized in the province, and he had been actively identified with oil development since then.

Arthur Keith, 81, former president of Geological Society of America, died February 7 at his home in Alexandria, Va. He was considered a foremost authority on the age and structure of the earth. He joined U. S. Geological Survey in Tennessee in 1887, and in 1907 he was placed in charge of areal and structural geology of Geologic Atlas of the United States.

Baxter H. Willis, 63, independent oil operator and teaming contractor, died February 3 in Beaumont, Tex.

William E. Perdew, 54, petroleum engineer, died February 12 in Wichita, Kans. He was a graduate of Leland Stanford University and during World War 1 served in U.S. Bureau of Mines. At the peace conference he was a member of the Inter-Allied Oil Commission. After the war, until 1924, he was with Union Oil Co., in Philadelphia. He then went to Wichita as general manager of Derby Oil Co. Two years later he joined the staff of Winkler-Koch Engineering Co., and he remained with that organization until his death. During the present war he had been serving as a consultant of the petroleum section of the Department of the Interior.

Announcement

FRICK-REID SUPPLY CORPORATION has been appointed exclusive distributor of JONES & LAUGHLIN oil country tubular goods in the territory east of the Rocky Mountains in the U. S. A.

Consolidation of offices in the oil and gas country with its parent company, JONES & LAUGHLIN STEEL CORPORATION, permits a unified service to the oil, gas and industrial trade.

FRICK-REID SUPPLY CORPORATION, which exclusively serves the oil and gas industries through its 61 branch stores and 19 district and sales offices, is now able to give the same direct service on oil country tubular goods as it is now giving on the general line of equipment and supplies, process engineering and constructon.

JONES & LAUGHLIN STEEL CORPORATION district offices in the oil and gas country are now in position to give an exclusive service on all other mill products to their industrial trade.

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Pressure-Operated Oil Treater Saves Equipment and Production Handling

by Neil Williams

The combination heater, treater and water knockout described in this article enables Sinclair-Wyoming Oil Co. to produce a single water-making well as an integral part of a centralized, pressure-maintained production system in its Wertz field, Wyoming. The installation eliminates individual handling of this production by separating the water under pressure and running the oil continuously direct to field lines.

SINCLAIR-WYOMING OIL CO. has devised a pressure-operated, combination oil heater, treater and water knockout which not only has proved exceptionally effective in treating a difficult production to handle, but has resulted in important savings in equipment and impressive economies and conveniences in operation.

The unit is being used on a single well in the Wertz field, in Wyoming, where the above company is carrying on pressure-maintenance operations.[1] This particular well, although structurally higher than many of the other wells in the field, has been the only one, except for a recently completed edge well, to make any water.

In the pressure-maintenance project, the production of all wells is flowed direct into a common gathering system to a central separator battery located at the pressure-maintenance plant. Handling the production of a single well making water as integral part of the field-wide production system presented complications that the pressure treater also has been able to remove.

Prior to installation of the pressure treater, an atmospheric-pressure, batch-treating system was employed. For this, an individual heater, a conventional gun barrel and a battery of tanks were provided at the well. In addition, a pump had to be used to put the treated oil into the field production line, which has been operated at pressures of from 40 to 50 lb.

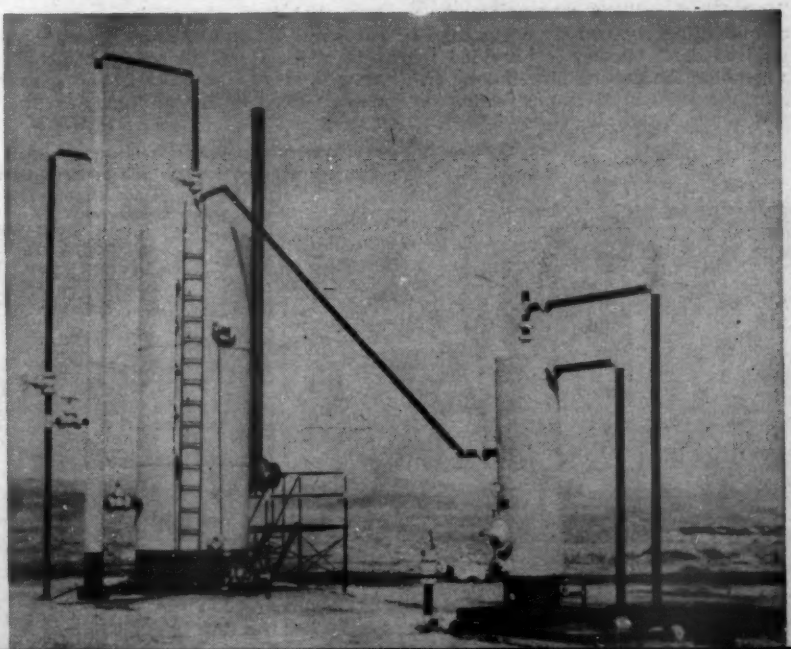
This system proved uneconomical and unsatisfactory as compared with the pressure treater. The production, carrying fresh water, was exceptionally difficult to treat. An excessive quantity of chemicals had to be used. Also, it required extra personnel to operate and maintain. In addition, at atmospheric pressure, whatever gas was produced with the oil was lost, since it could not be recovered and returned to the system.

The pressure treater is shown in an accompanying picture (Fig. 1). It is the shell of a low-pressure separator with all interior baffling, plates and other fixtures removed, and openings sealed. A standard B.S.&B. 24 by 4-in. gas-fired heating element was installed in the lower part. It also was fitted with a differential float-controlled discharge valve to maintain the water level.

On the outside, it has a vertical water "boot" with an overhead 3-in. outlet line direct to the top of the treater to permit the escape of any gas that might rise to the top. The oil, however, is undersaturated and there is very little gas released at this point.

Because of the water production, the well does not flow steadily and has an individual pumping unit. The well production is pumped through the 2½-in. lead line to the side of the water boot. The lead-line extension to the top inlet of the boot shown in Fig. 1 has not been used, and the valve shown in the extended line is closed. The extension was provided only to permit running the production to the top of the boot instead of to the side, if this ever should be desired.

Fig. 1: Pressure treater installation (left) and separator hook-up (right) for metering oil



1. Williams, Neil, The Oil and Gas Journal, Dec. 16, 1943, p. 60.

Fluid outlet from the boot is through the 4-in. connection into the bottom of the treater below the heating element.

Pressure in the treater is maintained just high enough to offset slightly the pressure in the field production system. This pressure now is approximately 50 lb. as against a pressure of around 40 lb. in the field lines. Temperature in the treater runs approximately 120° F., requiring a minimum of heat to maintain.

No gas is vented in the operation. This is retained in the system and is run with the treated oil to the field line to the pressure-maintenance plant. The additional separator shown in Fig. 1 is provided to facilitate metering the oil before running to the field production system. The overhead gas from the separator is returned to the oil stream after metering.

The combined gas and treated oil stream from the treater is run continuously through the overhead line to the separator by maintenance of the water level in the treater. The water discharge from the base of the treater is metered to provide an accurate check on the well's water production as well as the oil. At present the production is running about 70 bbl. of water with approximately 245 bbl. of oil. Capacity of the unit, however, is much greater than this.

Oil production is metered by means of a piston-type displacement meter installed on the separator fluid discharge line (Fig. 2). A check valve in the separator fluid discharge line downstream from the meter prevents reverse flow of production from the fluid system should pressure in the separator and treater go off.

Fig. 2: Oil-metering installation on separator discharge line, showing back-pressure check valve below meter

The top overhead line shown in the separator installation (Fig. 1) is an emergency vent line. Regularly, the gas leaves through the lower overhead line, which joins the oil-discharge line at a point not shown in the picture.

Since the production is run continuously under pressure direct to the field production line, the need for separate stock tanks at the well is eliminated, representing an important saving in equipment, investment and operation. The pressure operation also eliminates the need of a pump as would be required in an atmospheric treating system to put the oil into line.

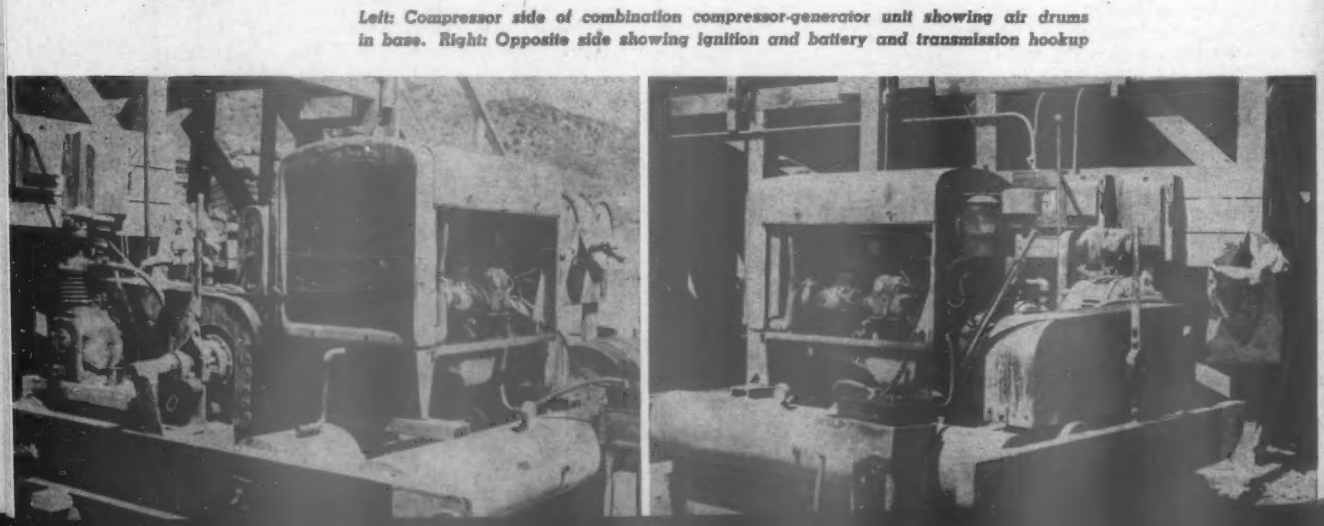
As the operation is entirely automatic and the production is run continuously under pressure to the field system, this well is an integral part of the field production system, instead of a separate operation.

The installation has been approved by the U. S. Geological Survey, which organization has supervision over the public lands involved in the unitization of the field.

Portable Combination Air Compressor And Generating Set Devised by Contractor

A COMPACT, combination air compressor and electric-generating unit is in use by one of the large West Coast drilling contractors on a deep-drilling rig, usually operating in isolated areas. Power is provided by a combination gas-gasoline-butane engine mounted on a frame resting on channel-iron cross members. The base contains air tanks, retained at each end with wide channel-iron side members that form the skids for moving the unit. Behind the engine on one side is the small air-cooled air compressor, also mounted on channel-iron bases tacked to the air tanks. On the opposite side of the frame is the a.c. generator having the exciter generator attached to the case at the top with cap screws and driven with a V-belt. The starting battery is at one side of the combination set, mounted in a steel basket supported with four legs made of pipe. The drive is from the conventional sheave on the end of the engine-clutch shaft to a jack shaft directly behind the engine. Two cone clutches are employed, one for the generator and the other for the air compressor. These operate against idler sheaves, which, when engaged, convey power to either or both units.

Left: Compressor side of combination compressor-generator unit showing air drums in base. Right: Opposite side showing ignition and battery and transmission hookup



Deep Gas Lift on Gulf Coast

by E. H. Short, Jr.

This article describes the procedure to be followed and the factors to be considered in installing and operating a surface-controlled intermittent gas-lift system in a deep well. Proper seating of the packer, spacing of unloading valves, and timing are important for effective and efficient functioning of the equipment.

USE of surface-controlled intermittent gas-lift systems has increased appreciably on the Gulf Coast during the past 18 months. This trend has been influenced by the following four conditions: (1) Necessity for lifting from great depth; (2) large fluid volumes; (3) wartime desirability of producing with a minimum outlay of equipment; (4) availability of high-pressure gas.

This method applies particularly to wells which are ceasing to flow naturally. These wells range in depth from over 8,000 ft. to over 10,000 ft., and the amount of fluid lifted varies between a few barrels (21 bbl. per day in one well) to several hundred barrels of fluid per day when it is necessary to handle large fluid volumes to produce the allowed oil production. In a great many cases this necessitates that the operating fluid level be maintained at a point close to the bottom of the hole. The application of surface-controlled intermittent gas lift to the production of wells where the fluid must be lifted from depths of approximately 9,000 ft. appears to be as successful as in the case of shallower wells, where such systems have been in operation for a number of years.

Subsurface Equipment

Typical of the deep Gulf Coast wells handled by this method of production is one located in a field south of New Orleans in La Fourche Parish, Louisiana. This installation is operating from 8,535 ft., with a surface operating pressure of 650 lb. The valve installation in this well is shown in Fig. 1. It will be noted that the packer is set at 9,298 ft. and that the lowest valve, immediately above the packer, is at 9,040 ft. In this particular system, the only other subsurface equipment required is the weight bar and wire line used as a means of opening and closing the valve located at 8,535 ft. through which the input gas enters the tubing.

Installation Procedure

With a given kickoff pressure available, valve setting can be determined accurately if the productivity index of the well is known. However, in a large number of cases, when natural flow ceases, there is little information available which can be used as a guide in determining the spacing of the single-port valves, which are referred to as unloading valves, and the three-port valves used in the lower part of a string of tubing as both unloading and working valves. Therefore, the first well in an area must necessarily be equipped to bottom with valves, the spacing of which is determined by the maximum kickoff pressure available. Since the operating level for producing the allowable production must be determined by trial, a greater number of working valves, or three-port valves, must be run than might ordinarily be necessary on subsequent installations in the same general area.

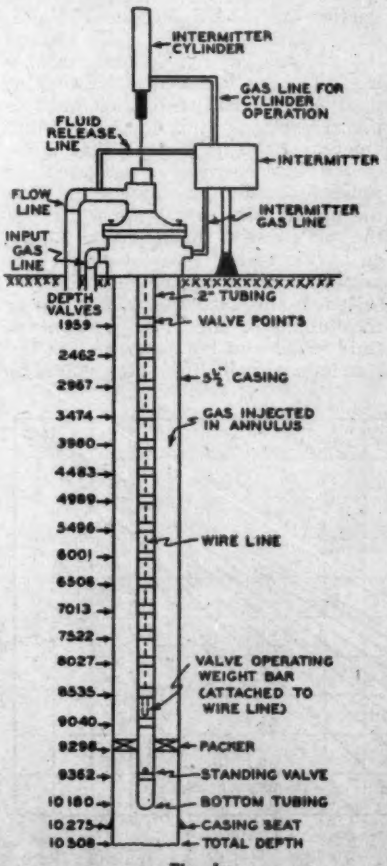


Fig. 1

In considering the installation of an intermittent system the maximum kickoff pressure available determines the spacing of the unloading valves. Gas for lifting is usually taken from high-pressure separators serving other wells in the area, and the separator pressures usually range from 500 to 700 lb. per sq. in. In other cases, high-pressure gas may be piped in from a distant lease.

The calculations involved in the preliminary considerations are comparatively simple and since the water-fluid ratio may vary considerably, the use of a chart, such as the one shown in Fig. 2, reduces the error hazard in selecting the interval at which valves should be inserted in the tubing string. Since all factors, such as friction and pressure drop through the valve ports cannot be accurately evaluated, it is considered safe procedure to install the unloading valves at 80 per cent of the interval indicated.

As an example, a kickoff pressure of 900 lb. per sq. in. might be available from lease separators. The fluid to be lifted is 40-gravity oil, with no water. By referring to the chart it will be noted that 40-gravity oil weighs 35.7 lb. per sq. in. per 100 ft. of height. Dividing the available kickoff pressure of 900 lb. per sq. in. by 35.7, an indicated valve setting of 2,520 ft. will be found. Allowing for friction, etc., and the possibility that the separator kickoff pressure might at times be somewhat below 900 lb. per sq. in., the valves should be set at 80 per cent of 2,520 ft. or at approximately 2,020 ft.

If the productivity index is known, unloading valves may be spaced at this interval down to point at which the well should be operated to produce the allowed production. However, if this is not known, it is necessary to place the first valve at 2,020 ft. and below this point at intervals of approximately 500 ft. The reason for the close spacing is obvious, since widely separated points of lift might afford two extreme conditions — that of no production at all or an amount greatly in excess of the allowable. While in the latter case the time interval at which the gas is injected could be decreased, it is desirable to keep the operating pressure considerably lower than the kickoff pressure. Then, too, operating under conditions which necessitate producing large slugs of this size increases the possibility of the well loading up. While it is a comparatively simple matter to pull

the weight bar up and work back to the operating level, such an operation would require many hours of labor, which at the moment are not always available.

It can be seen that once the operating level is established in a field, subsequent installations should be made with a minimum number of valves. In this hypothetical case, unloading valves could be installed at 2,000-ft. intervals in the tubing string. Then, if the first well equipped with an intermittent flow system operated, for example, at 8,000 ft., unloading valves might be placed at 2,000, 4,000, 6,000 and 7,000 ft., and also at 500-ft. intervals below 8,000 ft. The installation of valves below a current operating level of 8,000 ft. would permit the maintenance of the allowed production as the fluid level dropped, by simply lowering the weight bar to the next lower valve. Such an installation procedure eliminates the future necessity for unseating the packer and pulling tubing.

The proper setting of the packer, in connection with a closed-type intermitting gas-lift system (where packer and standing valve are used) is important in wells of any depth. While too much weight can be set on a packer in shallow wells, unless precautionary measures are closely observed, the chances for imposing too much weight on the packer are much greater in the deep Gulf Coast wells. The hook wall production-type packer is used in connection with these installations, and most operators attempt to set approximately 8,500 lb. of weight upon it, regardless of the depth at which it is set. The packer-setting technique varies among different operators. However, since the success of the whole system depends upon the perfect functioning of the packer and the straight hang of the tubing, the procedure receives expert attention. This involves the use of a weight indicator; and also careful calculations to determine the tubing stretch, which is added to the valve movement, sleeve collapse and slip travel to give an idea of total movement during the setting operation.

Intermittent Time Cycles

The proper timing on deep Gulf Coast wells, as in the case of shallower wells, must be determined by experimentation, although certain fundamental rules are observed in arriving at the time cycle for any lift. Input gas-fluid ratios can be held at a minimum by determining the maximum down-time interval at which a well can be operated to produce the allowed production. For example, a cycle involving a 30-minute down-time interval will require twice the gas volume as one where the down time amounts to 1 hour. Another rule observed, particularly on deep wells, is the conservation of gas possible by effecting a timing arrangement which will close the input valve before the fluid slug reaches the surface. The variation in timing cycles used on different types of lifts is illustrated by Fig. 3.

The deep-lift installation referred to at the beginning of this article produces 97 bbl. of oil per day and operates on a 4-minute-on-30-minute-off cycle. The slugs reach the surface approximately 2 minutes after the gas-input valve closes.

Operation

While this particular method of production has proved successful in handling extremely deep wells, several installations have given some trouble in loading up. While it is a comparatively simple matter to kick back to the normal operating level, a certain amount of the field man's time is required. One operator investigated the cause for loading up and found that the choke location (at the well) was the sole cause of the condition. Located at this point, it would not permit passage of the complete slug. This resulted in the gradual building up in the tubing of the small amount of fluid which did not pass through the restriction each time the well was kicked. The choke, therefore, was removed from the tree and placed in the flow line near the separator, and at the same time a check valve was inserted in the flow line near the well. This comparatively simple change completely eliminated the loading-up difficulty. The reason is obvious; since, for example, if a choke is located in a 2-in. flow line approximately 280 ft. from a well producing 1 bbl. per kick, the line will accommodate the production each time the well flows. The check valve prevents the oil from running back into the tubing and the pressure remaining in the tubing is great enough to force the oil through the choke at its new location in the flow line.

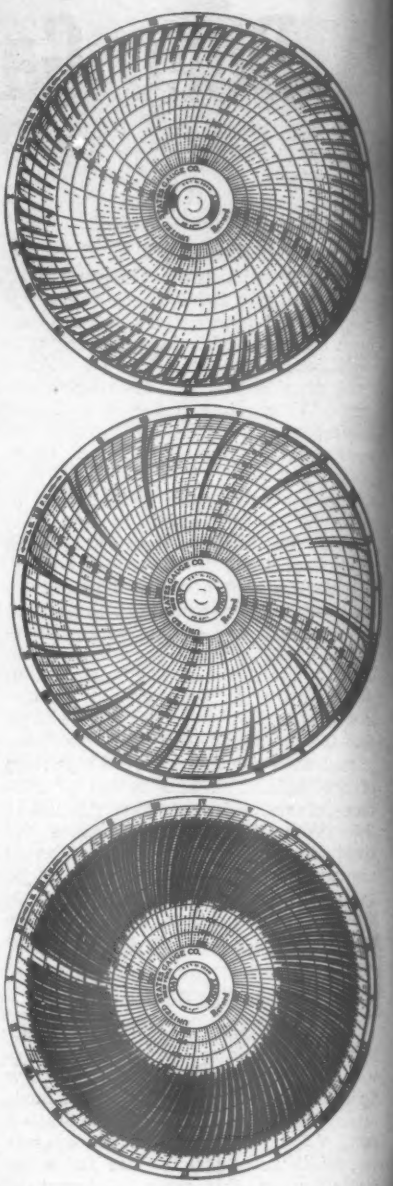


Fig. 3—Examples of various timing cycles as shown by recording pressure gage

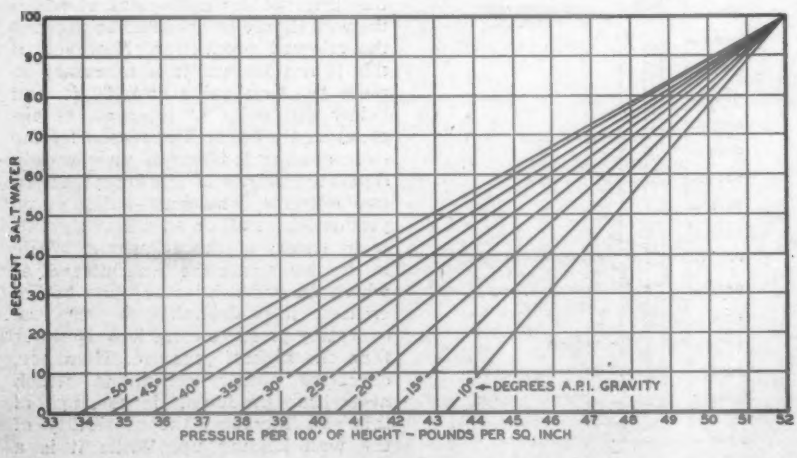


Fig. 2

AND EQUIPMENT IS MANUFACTURED

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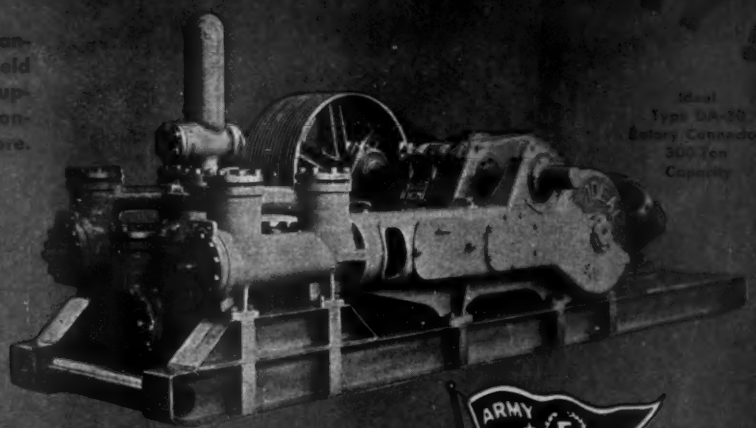

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Oil-Well Pumping Practices—No. 27

Rules for Installation of Rod-Line Equipment

by J. Zaba

Proper installation of rod-line equipment is essential to satisfactory performance of modern multiple pumping systems. Attention to small details in hookups of jacks, swings, holdovers and other devices often results in substantial reductions in loads and stresses and increased efficiency in power requirements. This installment deals with the factors affecting the operation of this equipment.

THE equipment of a modern rod-line system is designed for a specific set of conditions and is given accordingly its specific rating. Assuming that the equipment is used within its rating, there is still need for proper installation, if the equipment is to perform satisfactorily. Attention to certain simple details of installation will result in considerable saving of wear and tear of equipment. This saving will express itself both in eliminating, or at least reducing, the cost of some of the repairs, and in reducing loss of production caused by shutdowns for repairs. Most of these details of installation are quite obvious once some thought is given to the basic principles underlying the operation of the rod-line equipment and to the geometry of the layout of the rod-line installations.

One of the basic principles which is utilized in design of the rod-line equipment is the simple law of leverage. By its proper application loads can be reduced with the resulting saving in fuel and wear and tear of equipment. Additional advantage can be taken of this principle in the installation of the equipment. As an example experiments can be cited, performed over 12 years ago, on an Oklahoma type pumping jack.[1] These experiments showed that reduction of rod-line loads can be attained by having the beam on the jack rise, during the upstroke, no higher than the horizontal position. Experiments were performed on wells on which the pull rod was attached to the bottom brace in such a manner that the jack beam was traveling, in its pumping cycle, half way up and half way below the horizontal position. The well was weighed with a pull-rod dynamometer and showed the maximum load of 2,225 lb. The rod line was then lengthened, by means of the turnbuckle at the jack, in such a manner that all the movement of the jack was below the horizontal. With this arrangement the pull-rod dynamometer showed the weight of 2,075 lb., a reduction of 150 lb. Much larger reduction was attained by such change in cases in which the rod line was running downhill from the power to the well and in which the jack was "pulling high," that is, the jack beam was above the horizontal at the bottom of the upstroke. Similar results were secured by changing the shape of the bottom brace in such a manner that the rod line was vertical to the upright arm of the brace at the top of the stroke. Although this load reduction per well is rather small, it may add to considerable total in case of a central pumping power operating a large number of shallow wells. No reduction of load could be expected in cases in which the rod line runs uphill to the well since in such a case the rod line has already the advantage of leverage.

The above example has been cited to show how in isolated cases the advantage can be gained by small changes in an existing installation. Of greater importance are rules covering actual installations of the equipment since they apply to any installation and since they have important bearing on the performance of the equipment.

Pumping Jacks

The manufacturer's polished-rod load rating of pumping jacks is usually conservative. This rating is a result of design of bearings and component parts of the jack for certain loadings. Under conditions of such loadings the pumping jack will perform satisfactorily. No pumping jack, however, can be expected to give satisfactory service under conditions of loads for which it was not designed. Such loads may result from improper installation of the jack.[2] Unless there is proper alignment between jack and the center line of the rod line, lateral loads will be imposed on the pull-strap bearing and the upright arm of the jack. Also the pull straps will not be equally loaded and they will be subjected to bending loads in addition to regular tensile stresses. Similar adverse loadings will result if the top of the jack frame is not level. Excessive vibration of the jack, because of improper foundation or improper setting of the jack on the foundation, imposes additional stresses on the turnbuckle and on the rod line.

Swings

There are few simple rules which, if observed in installation of horizontal swinging devices, contribute toward satisfactory performance of these devices and reduce the wear and tear both on the swinging devices and on the rod lines.[3,4,5]

The swinging devices should be set as far away from the knockoffs as practicable in order to reduce the shock resulting from hooking on and knocking off of the wells. Use of devices which protect the swing from damage in case of break of rod line between the swing and the power may save considerable repair expense. Of these devices, the bumper post installed in the rod line in conjunction with friction clamp on the rod line has the advantage of ease of adjustment for changes in length of stroke. These devices represent also a very desirable safety precaution.

All horizontal swinging devices involve horizontal loads resulting in bending and overturning moments with respect to swing post and swing-post foundation. Placing of rod lines as close to the ground as practicable reduces these moments by reducing the arm over which the force is act-

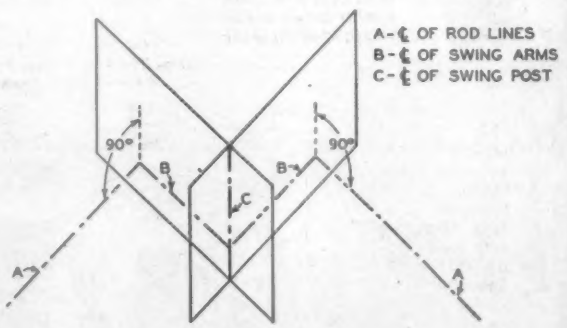

Fig. 1: Correct installation of a rod-line swing

ing. Another factor which affects the magnitude of these moments is the angle between the rod lines connected to the arms of the swing. In laying out the rod lines this angle should be kept as large as conditions permit. Increasing of the angle between the rod lines reduces the resultant force acting on the swing post and on the foundation.

A swing should be installed in such manner that the swing post is set at the line of intersection of two planes, through arms of the swing, which planes are perpendicular to the line of pull of rod lines. In other words, the swing post should be set vertically only for installations in which the pull rods attached to the arms of the swing are horizontal (Fig. 1). If this rule is not followed the bearings of the swing will be subjected to eccentric loads, which fact will have unfavorable effect on the life of bearings. Vertical loads will also be imposed on swing arms, which are designed to withstand primarily horizontal loads.

The pull rod should be connected to the arms of the swing in such a manner that, at the point at which the center line of the rod line is vertical to the swing arm, the end bearing of the rod-line connection is on this side of the center line of the rod line which is away from the swing post. The center line of the rod line should divide into equal parts the lateral travel of the end bearing (Fig. 2). Such an arrangement reduces the effect of bending of pull rods resulting from lateral movement of the rod line at the swing.

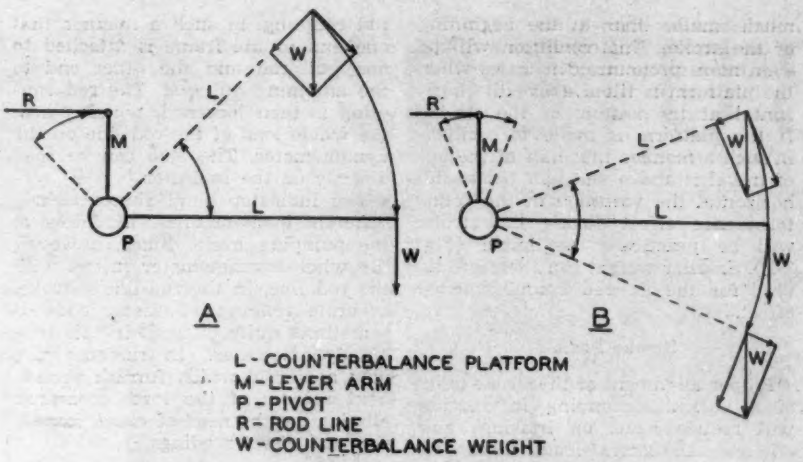

Fig. 3: Line drawing showing counterbalance effect for different paths of travel of a counterbalancing dummy

Holdovers

Most of the rules of installation of swings apply also to installation of holdovers. As far as the position in relation to the pull rod is concerned the holdover should be set in such a position that at the middle of the stroke the holdover arm divides into equal parts the inside angle of the rods. At this point the end bearing should be outside the point of intersection of center lines of the rod lines, the distance from the point of intersection depending on the length of stroke.

Holdups and Holddowns

To make sure that the rod-line bearing of a pendulum holdup or holddown travels in the vertical plane through the rod line, the shaft of the rocker arm of the pendulum must be installed so that it is perpendicular to this plane. If this condition is fulfilled no lateral loads are imposed on the rocker bearing. At the point of the middle of the stroke the pendulum should be in vertical position to reduce to minimum the vertical travel of the rod line.

Counterbalancing Devices

One of quite commonly used counterbalancing devices in a central-power rod-line system is an inclined platform loaded with weights on one end and pivoted on the other end on a horizontal shaft. A vertical lever arm attached to the pivoted end of the platform connects with the rod line imparting to the platform the oscillating motion of the rod line. Thus a lever system is created through which the weight on the platform performs its counterbalancing function. Here again proper application of leverage permits use of smaller weights, for a given counterbalance effect.[6] In Fig. 3-A arrangement is shown in which the platform oscillates between horizontal and a position inclined to the horizontal at an angle corresponding to the rod-line stroke. Since only the component of the weight W, vertical to the each instantaneous position of the platform, will act as counterbalance through the lever L (Fig. 3-A) it is evident that there will be considerable change during the platform's full stroke, in counterbalancing effect of the weight. At the top of the platform's stroke the counterbalance effect will be

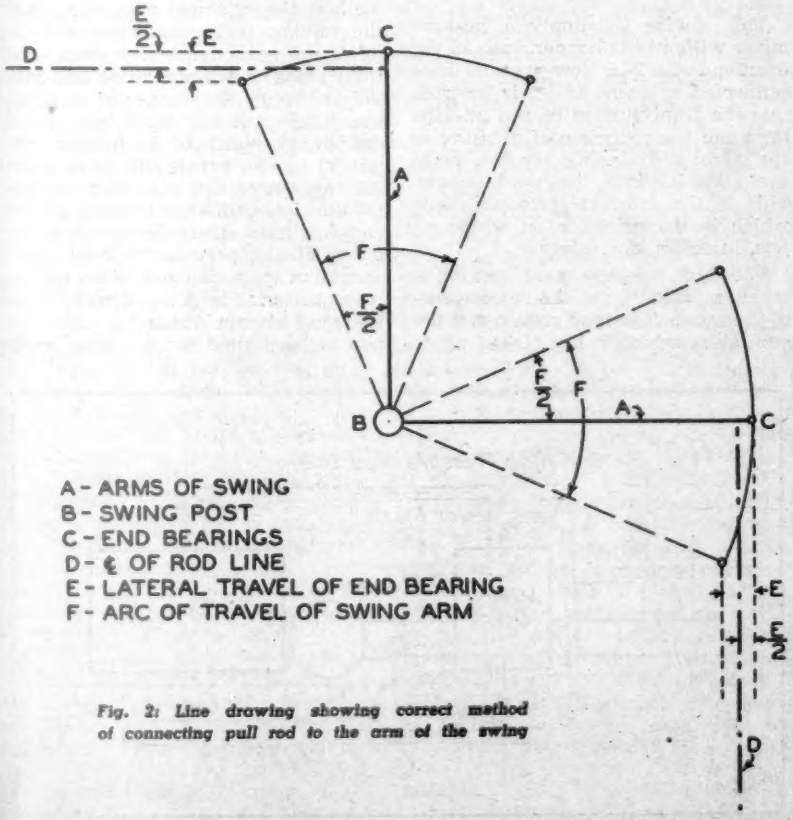

Fig. 2: Line drawing showing correct method of connecting pull rod to the arm of the swing

much smaller than at the beginning of the stroke. This condition will be even more pronounced in cases when the platform is tilted above the horizontal at the bottom of the stroke. If the platform is made to oscillate in such a manner that half of the arc of travel is above and half below the horizontal the variation in the counterbalance effect during the stroke will be practically negligible (Fig. 3-B). Smaller weight can therefore be used for the desired counterbalance effect.

Stroke Posts[2,3]

Proper alignment of the stroke posts of a backside pumping installation will reduce loads on bearings and eliminate the lateral loads. In case of pendulum-type stroke posts the saddle shaft must be parallel to the crankshaft and the center lines of the wrist pin, of the saddle shaft and of the rod line must be in a vertical plane. The arc of travel of the stroke post should be bisected by the vertical line through the center of the saddle shaft.

Hookoffs

There exists a large number of different types of hookoff devices and it would be difficult to cite any general rules of installation covering all the types. Construction of modern hookoffs does make provision for reduction of stresses resulting from lateral movement of rods. Selection of any particular type of hookoff is a matter not only of design and of manner of operation but also of initial cost and safety.

Results have been presented of an interesting photoelastic study of distribution of stresses in a slide bar hookoff.[7] The results of this study indicate that all bending stresses are eliminated and good distribution of stresses around the notches of the bar is secured, if the center line of pull of rod line is located in the upper part of the blank part of the slide bar.

In the preceding installment of this series discussion was presented of the concept of rod-line pull used in calculations of design of rod lines and of rod-line equipment. Formulas were presented for calculation of the magnitude of this pull and references were made to its measurement. Before concluding the discussion of rod-line system and starting consideration of other component parts of multiple sucker-rod pumping installations, brief mention must be made of the instrument used for measuring of the rod-line pull.

Pull-Rod Dynamometer

In its basic design the pull-rod dynamometer consists of a frame, incorporating a tension-measuring element, and an indicator. The frame is clamped on the rod line, at the pull-rod coupling, in such a manner that one end of the frame is attached to one pull rod and the other end to the adjoining pull rod. The rod coupling is then loosened, which places the whole load of the rod line on the dynamometer. The load can be read directly on the indicator.

The indicator hand shows clearly different loads of different phases of the pumping cycle. Since, however, the whole dynamometer moves with the rod line, in the rod-line's stroke, accurate reading of these loads is sometimes quite difficult in this type of dynamometer. Instruments are now available which furnish permanent records of the loads measured eliminating the need of visual inspection and direct readings.

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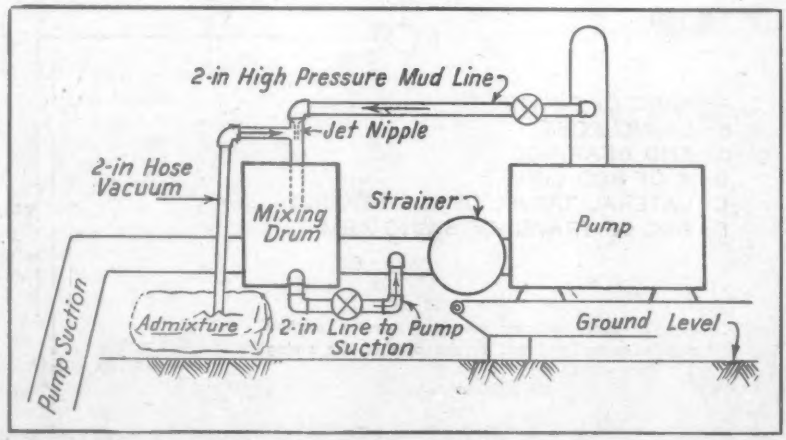
Mud-Mixing System for One-Pump Rig Uses Jet-Type Device Without Hopper

Could you give us a little more detail on the operation and possibly a diagram of the mud-mixing method shown in Operating Ideas on page 222 of the December 30, 1943, issue of The Oil and Gas Journal?—M. M. S.

This device is simply a jet-type mixer without the hopper. Instead the open end of a 2-in., low-pressure hose connected adjacent to jet is inserted into the admixture to be put into the mud and the reduction of pressure in the area surrounding the jet sucks the material into the mud stream. This is the familiar Bernoulli's law which is the principle on which all jets, injectors, etc., operate.

The high-pressure mud stream is taken as usual from the release line of the pump. The mud stream and the admixture which it has picked up at the mixing jet empties into a barrel which has an outlet at the bottom connected to the pump suction. This outlet is controlled by a valve and the fluid height in the barrel can thus be regulated.

There are several advantages to the method, the principal ones being that the mixing is accomplished with a minimum reduction in the amount of fluid going to the standpipe and into the drill pipe, the danger of slugging the fluid with too much admixture (which is common to the hopper-type mixer) is eliminated, and there is no settling out of the admixture in the pit due to insufficient mixing as the enriched mud enters directly into the pump. It also permits the mud characteristics to be changed rather quickly as material is going directly into the mud stream instead of into the pits to be diluted by the other mud.



Welded Surface Casing

by Harry F. Simons

A NUMBER of companies now use welded pipe for surface casing quite extensively as this practice has been gradually increasing in the past few years. In one pool in North Central Texas practically all of the wells drilled to date have been equipped with 10¼-in. welded casing to a depth of approximately 600 ft. Generally this casing is three gage in thickness and spiral welded.

There are two types of casing designed for joining by welding. One type comes with beveled ends while the other is the bell-and-spigot type. Accompanying photographs show the latter type being run in a well.

Running welded surface casing is essentially the same as running threaded and coupled pipe, with certain modifications. Where bevel-end pipe is used, the elevators for handling the casing string must be of the slip type. The joints of plain-end casing are generally lifted with a special hinged clamp with interior serrations which is attached to the cat line. Lineup clamps are used with this type pipe to hold the casing in position for tacking and welding.

Bell-and-spigot pipe can be handled with either center latch or side-door elevators as the bell provides a lifting shoulder. While some operators use lineup clamps they are not indispensable as the spigot when fitted into the bell lines up the pipe. Each joint of pipe is pulled into the derrick with the cat line and then the elevators placed on it for lifting it to the vertical position. Sometimes a man is stationed on a stabbing board in the derrick to help steady the blocks and the upper end of the pipe but often this is not necessary.

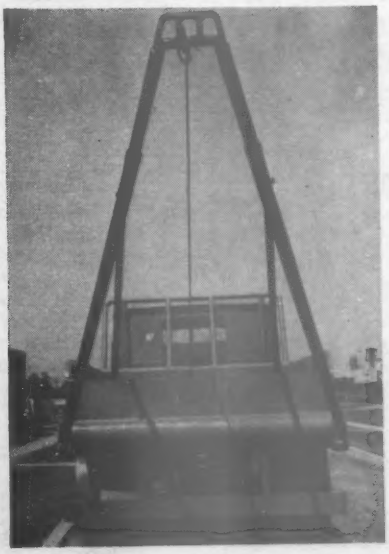
The use of welded casing has caused some changes in other casing equipment such as the shoe and the cementing head. A screw-type casing shoe would obviously be unsuitable and shoe manufacturers now carry special shoes which can be slipped over the lower end of the pipe and welded in place. As the last joint (landing joint) does not have threads or a threaded collar on it, it is necessary that a special cementing head be used or a threaded nipple welded to the top of the landing joint so a regular cementing head can be used for the placement of the cement. A special head equipped with slips and packer is available and this can be slipped into place quickly. With the slips and packer expanded, cement can be forced down the pipe under pressure. After the cement has set, the pressure can be released and the cementing head removed. The casing can then be cut off with a welding torch at the proper point in the cellar and either a threaded nipple or a flanged connection welded into place so the control equipment can be installed.

(Continued on page 68)

PIPE-LINE SUGGESTIONS

Ears on Wheel of Ditching Machine

SMALL steel plates have been welded on the rims of ditching machines. These "ears" as they are called serve the purpose of preventing the ditcher from sliding when it is operating on sloping ground, sometimes unfavorable to straight ditching.



Gang Truck for Line Maintenance

FOR meeting the demands for maintenance and repair of a products pipe line, special truck equipment has been designed. The "A" frame at the rear has been made to conform with the requirements of this type of service; the tool box is large and accessible; and the cab provides for transporting the entire pipe-line gang comfortably with its baggage taken for trips which may require absence from headquarters for several days. Each member of the gang has a suit case stowed in the cab at all times so as to be ready for sudden calls.

Rear of Car Is Adapted For Gaging Equipment

TO facilitate testing operations and the transportation of special equipment needed in his work, a pipe-line gager has utilized the baggage compartment at the rear of his car. Equipment and containers of equipment are installed conveniently and securely to the floor and wall of the compartment; use is even made of the underside of the turtleback. Interior of the compartment has been painted with a color which reflects light so that objects may be more easily located at all times of the day and night.

Holder for Thermometer

TO obtain satisfactory readings of atmospheric temperatures, the thermometer at a natural-gas pipe-line compressor station has been placed on a wood block, supported by a post made of 2-in. pipe rising from the ground a few feet from the north wall of the office building, where air circulates freely about it and where it is not affected by the temperature of the wall. These provisions have saved the gager much time in the performance of his duties.

REFINERY CLEANING PROBLEMS

Methods and materials that have been developed for effective, safe cleaning

*by Dr. R. W. Mitchell**

This is the second and final part of a discussion which began in last week's issue. The author continues his outline of the usual cleaning problems in the refinery, describes the reasons for cleaning and indicates the method and type of cleaning materials best suited to the individual problem.

THE asphaltum, muck and other dirts which clog the trays and caps of bubble towers and fractionating columns have a major effect on the efficiency of operations. As in the case of heat exchangers, manual cleaning, with partial dismantling, is often employed and quite needlessly. Today there is no excuse for the production time lost by manual cleaning methods, when a well-planned cleaning routine, using the heavy-duty type of cleaner already discussed will solve this problem effectively and speedily.

There are two procedures using this solution. One is to use an 8-oz. per gal. solution, pumped from a storage tank into the top of the tower with the outlet valve closed. When the tower is filled, live steam is admitted and used to heat and agitate the solution for ½ to 2 hours, depending on conditions of dirt. Then the outlet valve is opened and the solution drained off into the storage tank for subsequent reuse with the addition of such cleaner as has been used up in the cleaning operation.

The tower is then rinsed two or three times by flushing through with fresh water from the top down. This operation takes from ½ to 1 hour.

The other method is to circulate the 8-oz. per gal. solution at boiling temperature for ½ to 1 hour, again depending on conditions, through the tower, followed by rinsing as before. This method is materially shorter than the first, but where clogging has resulted from neglected cleaning routine, the first method may be more suitable. On the other hand, where a regular routine has been set up and carefully maintained, the circulation method will in most cases insure a constantly clean system. Scale formation on the water phase of these systems may often cause trouble. Here the problem is to remove deposits which are practically identical with those found in the cooling systems of internal-combustion engines.

Alkaline cleaners or caustics are not suitable, since they do an indifferent job in removing heavy lime and silicate deposits. An acid action is needed. This can be obtained by the use of an inhibited acid cleaner designed for the cleaning of scaled cooling systems.

This type of cleaner is usually supplied in liquid form and used in the water phase of these towers at a dilution of about one part to three of water. This solution is pumped into the water side and allowed to remain in contact with the interior for about 15 minutes. This will usually suffice to dissolve and loosen the scale rust though long-neglected systems may require more time. After this period, the cleaning solution is drawn off and reserved for further use. The system is then thoroughly flushed out with fresh water and given a security rinse with a mild alkaline solution to neutralize any traces of the acid cleaner.

Barrel and Drum Washing

Wartime shortages of both metal and wooden containers make the problem of cleaning drums and barrels for reuse and for preservation maintenance a most important one. Whether the problem is simply one of cleaning for reuse or of cleaning or stripping for repainting, the use of the right type of cleaner will simplify this cleaning job and reduce over-all costs.

For the cleaning of refinery containers where the main purpose is to get them ready for reuse, it is not necessary to use a cleaner as strong as the heavy-duty cleaner previously described. A specially compounded alkaline cleaner, with a sufficiently high pH (about 12.5) to penetrate and disperse oily and greasy deposits, plus added wetting action to insure speedy action and good rinsing properties, will do an excellent job on either wood or metal containers. It is used in a solution of 6 oz. per gal. of water at room temperature. This solution is

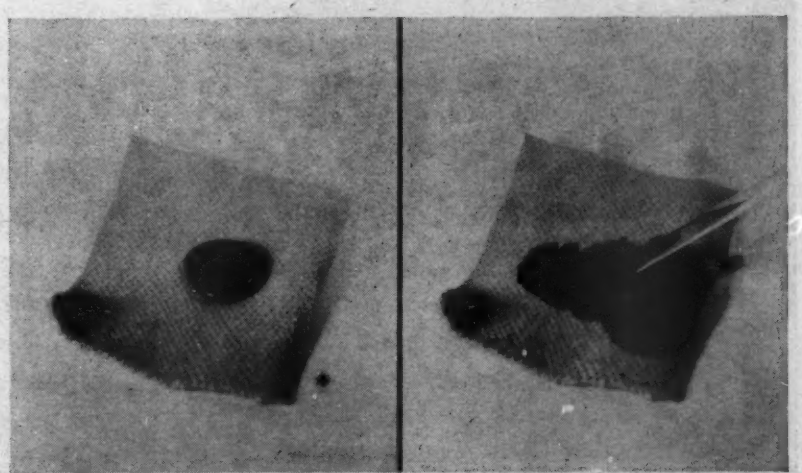
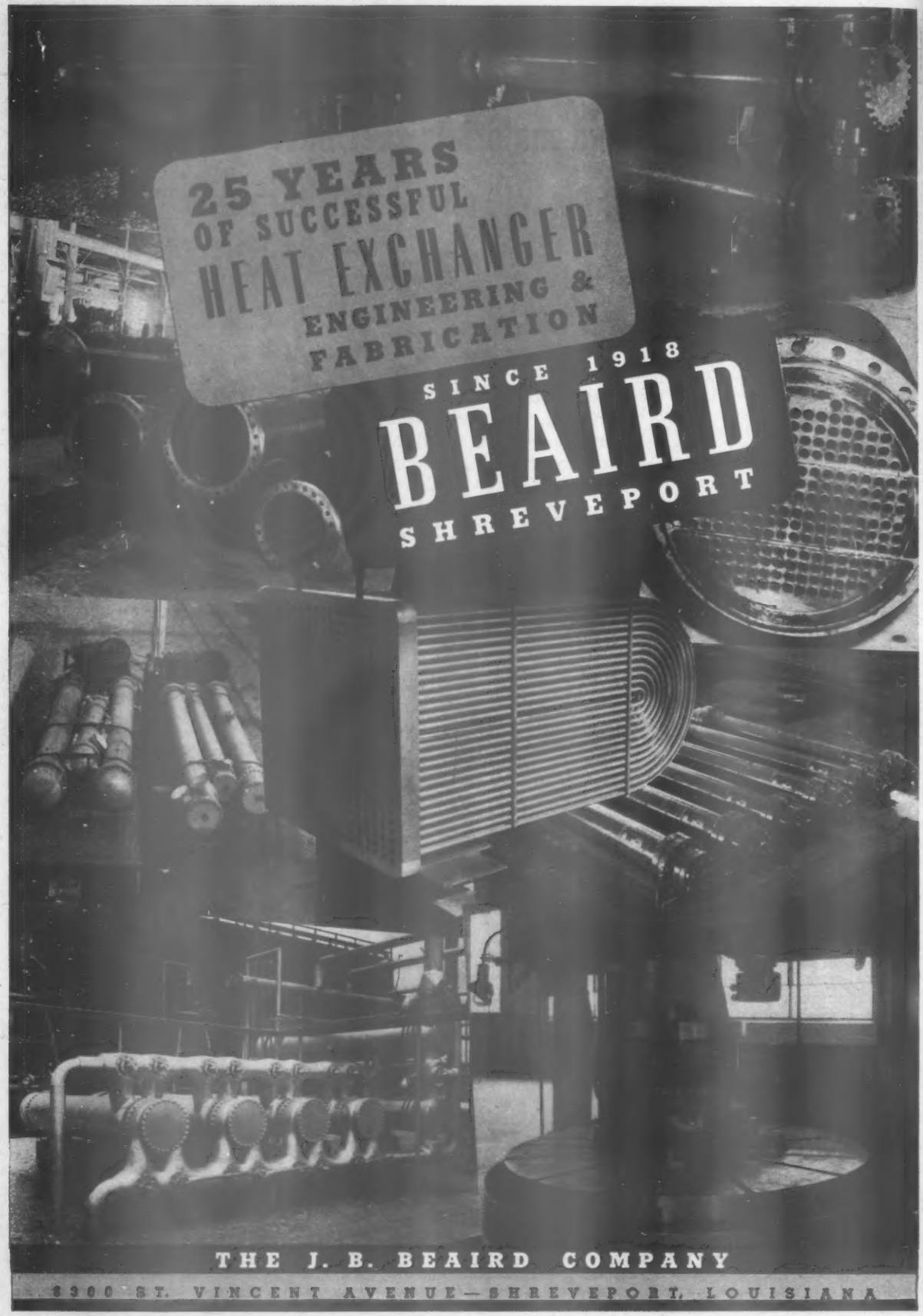


Fig. 4—An illustration of the action and usefulness of wetting agents in cleaning solutions: a viscous liquid does not spread on a dry cloth, left; add a very small amount of a wetting agent, right, and the liquid spreads out and is absorbed in the cloth

*Technical Director, Magnus Chemical Co.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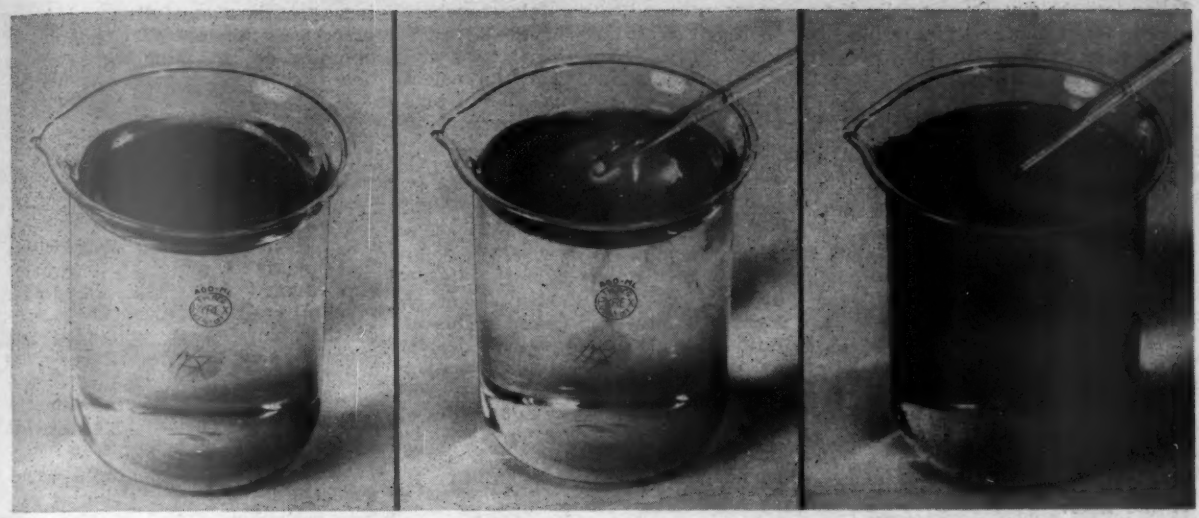


Fig. 5—Effect of wetting agents on the dispersion (emulsification) of carbon black in water. Left, carbon black spread over water surface; in the absence of a wetting agent, center, stirring the black does not mix it appreciably with the water; right, with a wetting agent present, the stirred black disperses in the liquid. Effect is similar to that obtained when removing dirt by dispersing it in a cleaning solution

run into the containers and allowed to soak in for about 5 minutes. If washing machines or washing racks are employed, the solution may be materially diluted.

After this soak, the cleaner solution is withdrawn and saved for future use. (It can be used for long periods, with suitable makeup.) The containers are then thoroughly rinsed with fresh water.

Where cleaning discloses need for stripping before repainting, the same kind of stripping solution as that recommended for storage tanks is usually employed. The regular 8-oz. per gal. of boiling heavy-duty cleaner solution is used in a shallow tank in which drums or barrels are rolled, either by hand or by various mechanical means. This treatment not only will remove paint but will clean these containers effectively, so that if stripping is obviously necessary, the cleaning and stripping operation can be carried out in the one operation. After removal of the paint, containers are rinsed with hot water.

In the case of metal drums, this hot-water rinse makes them virtually self-drying, so that they are ready for painting immediately. If they are not to be painted at once, it is wise to give them a spray with a rust preventive which forms a dry, protective coating over which paint can be safely applied.

Salvage Cleaning of Piping, Equipment, etc.

In these days of acute shortages, cleaning of equipment and parts, particularly pipe and fittings before storage prior to reuse, is a vitally important phase of refinery operations.

The heavy-duty cleaner already described is used in vats or tanks large enough to hold standard pipe lengths and to immerse the parts to be cleaned. The regular 8-oz. per gal. solution is employed—at boiling temperature. Pipe and fittings and any other objects to be cleaned of dirt, rust and other foreign deposits are boiled in this solution for 15 to 30 minutes, after which they are rinsed with water, usually in a separate tank where one or two rinses are given. If the last rinse is hot, the bulk of the objects being cleaned will usually make them self-drying. Where heavy rust must be removed, the heavy-duty cleaner is not enough. Such objects should be penetrated with an inhibited acid cleaner of the type previously recommended for scale removal. A 50-50 solution of this cleaner will remove rust deposits in a 3-to-5 minute soak in most cases. Then the parts are rinsed and given the heavy-duty cleaner treatment.

Parts cleaned in this way are usually stored for future service. Hence the problem of rust prevention must be solved. This is best accomplished by the use of the rust-protective coating mentioned under metal drums.

This protective coating provides a thin, tough, dry coat which sets permanently in 24 hours after application. It will serve for long periods to protect cleaned piping and other equipment in outdoor storage. It is supplied in concentrated form, to be mixed in the proportions of one part concentrate to three parts safety solvent or VM&P naphtha. The resulting solution is sprayed, dipped or brushed on the object to be treated.

Cleaning Plant and Other Floors

The choice of a suitable cleaning material for various types of floors, whether in the plant or in plant office buildings, is much more important than it might seem. There is no single cleaner suited to all kinds of floors. And the type of cleaner is not governed as much by the kind of dirt to be removed as by the kind of surface to be cleaned. An unsuitable cleaner can cause extensive damage to a floor surface, shortening its effective life by a large amount.

Cement floors.—In cleaning cement floors, the main objective is the removal of dirt, usually greasy or oily, without damage to the cement surface. This involves not only speedy and effective penetration of the dirt deposits, but thorough removal of all traces of the cleaning solution after washing. Otherwise, when alkaline types of cleaners are used, unrinsed residues penetrate into the microscopic fissures in the cement surface and dry out. The alkaline salts which crystallize when this drying out occurs, expand, and tend to crack the cement, leading to spalling and gradual disintegration of the surface. One reason why scouring powders are hard on cement surfaces is that they are usually high in alkaline content and are, in addition, hard to rinse away completely. They lead to extensive damage in the manner outlined above. It should also be noted that unrinsed cleaner residues on any floor greatly increase the slippage hazard. The most suitable type of cleaner for cement surfaces is alkaline in character, but it is also provided with added wetting properties, not only to insure speedy penetration and rapid dispersal of dirt deposits, but to provide for thorough rinsing. Such a cleaner does not require extensive scrubbing or brushing. The surface to be cleaned is sprinkled lightly over an area of about 10 sq. ft., which has been thoroughly wetted with water. Then this area is brushed with an ordinary floor brush, working the so-

lution into the dirt. On normally dirty floors, a few minutes of brushing is all that is required. Then the area is flushed off with a hose, or brushed off with fresh water.

Instead of the sprinkling method, a solution of the cleaner can be used, at a concentration of about 5 oz. per gal. of water. The solution is applied over a similar area and the cleaning operation carried on in the same way. When dirt deposits are heavy, or exceptionally greasy or oily, it is well to score the deposits so as to allow the solution to penetrate faster.

This type of cleaner can easily be provided with properties which greatly improve results. It should be able to whiten the cement surface it cleans —and also to harden it. Thus, instead of harming the surface, it can be used to add materially to the effective life of the floor.

On some cement floors, grease and oil stains have penetrated into the cement and the type of cleaner just described is relatively ineffective on such areas. In this case, a different type of cleaner is recommended. This is an emulsifiable solvent cleaner, shipped as a concentrate, which is mixed with kerosene or safety solvent in use. The mixture, made up of one part concentrate to eight parts kerosene or safety solvent, is brushed on the greasy area and allowed to soak in for 15 minutes or so. Then the area is flushed off with water under pressure.

This type of cleaner has the property of taking the "cling" out of oil and grease. It penetrates deeply into the greasy deposit, loosening it from the cement. When the flushing water hits the area being cleaned, the loosened dirt is knocked off and carried away in the emulsion formed when the cleaner mixes with the water.

Other types of floors.— Linoleum or tile floors require a different type of cleaner. Here a strongly or even mildly alkaline material will attack the surface during the cleaning operation, not only dulling colors and destroying brightness, but actually ruining the surface beyond repair.

The solvent soap recommended above for cleaning tank exteriors is exceptionally useful in cleaning linoleum, tile, and painted wooden floors, because it is a neutral material, based on a neutral soap. It works speedily and also rinses off completely, leaving a bright, film-free surface. Often the brilliance of the original floor is almost completely restored after a few washings with this soap. The same dilute solution of one teaspoonful per gallon may be used with equal effectiveness in hot or cold water.

Other Cleaning Operations

This solvent soap cleaner has a number of other applications in the cleaning of toilets, washrooms, shower rooms and other places where thorough cleaning should be combined with effective deodorizing and disinfecting action. The ingredient which imparts a strong odor of pine oil to this cleaner also acts to bring about this disinfecting and deodorizing action.

Hand Cleaning and Skin Protection

No discussion of the cleaning problems of the oil refinery would be complete without some attention being given to the important problem of hand cleaning. The worker in the oil refinery has to contend with deeply embedded grime, which is not easy to remove with ordinary soap—yet which causes considerable trouble, when dangerously abrasive or chemically harmful hand-cleaning compounds are resorted to in an attempt to remove it quickly.

It seems obvious that the only effective way to insure the use of a safe and dependable hand cleaner in any plant is for management to assume the cost and responsibility for all hand-cleaning materials used in the plant. In other words, if you make a suitable study of hand cleaners from the viewpoint of safety, speed and effectiveness and select a type which meets your requirements, then you should see to it that all plant washrooms are supplied with this material and that no other cleaner is used in washing up in the plant. In this way you can control what is otherwise a serious hazard.

An effective hand cleaner must contain a detergent strong enough to penetrate and disperse oily dirt. If you use a weak detergent and depend on added scouring agents to rub away the dirt, you are inviting abrasions and infections. Yet the cleaner must not be strongly alkaline, because then you can not only have harmful attack on the skin, but the alkalines will rob the skin of its natural oils, with resulting chapping and cracking. This is another invitation to infection.

However, no industrial hand cleaner can be effective if it depends on detergents alone. A scouring agent of some kind is essential, to insure speedy removal of dirt, without time-consuming prolonged brushing and scrubbing. Such scrubbing is in itself harmful since it tends to abrade the skin, particularly where hands are tender. Hence it is well to look for the character of the scouring agent used in a hand cleaner. Sand soaps are obviously too harsh, from this viewpoint. Actually, for hands that are not dirtied with accompanying embedding of solid particles, the most effective scouring agent is a material of the nature of corn meal. Where dirt is embedded, it will be found that corn-meal type scouring agents are not quite enough for quick cleaning. Here the most desirable scouring agent is a carefully graded and processed pumice—not capable of abrading or scratching the skin, but able to do the cleaning job called for.

Welded Surface Casing

(Continued from page 61)

The running of welded surface casing does not take much longer than the running of a string of threaded and coupled pipe. This is because practically all operators welded most of the joints of the threaded and coupled pipe anyway. Purpose of welding threaded and coupled pipe is to prevent its backing off while the hole below the surface pipe is being drilled.

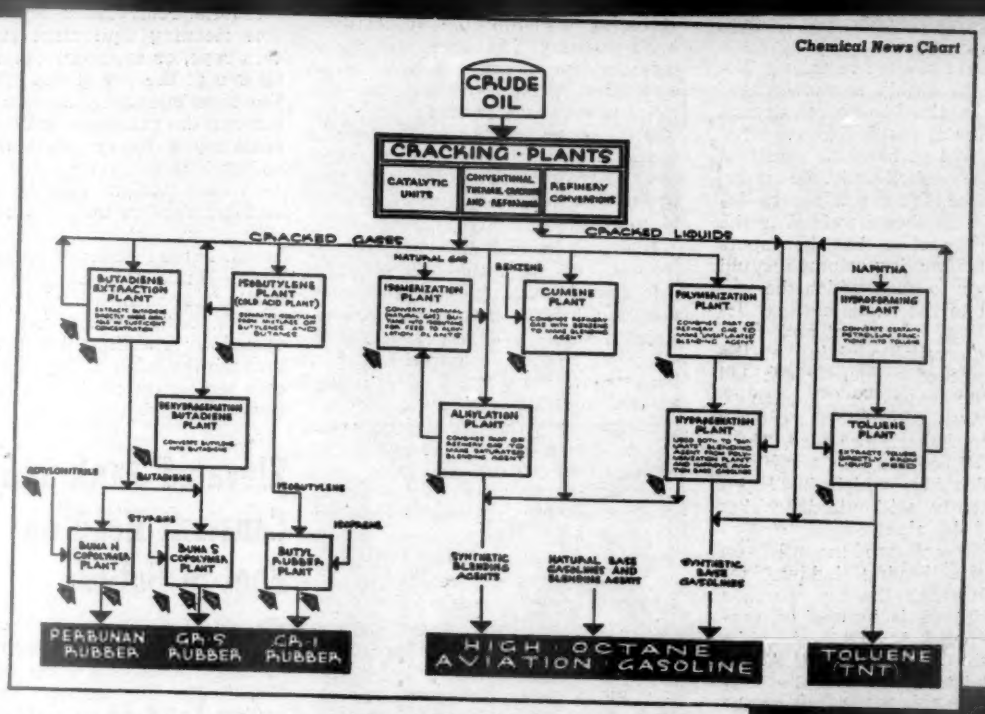
Accompanying photographs show the steps in running a string of surface casing in a well in Montague County, Texas. The first photo shows the Texas pattern shoe electric welded to the end of the bottom joint; the master bushings have been removed from the rotary table. Second photo shows the casing spider being put into place by the drilling crew and in photo three the welder is spot electric welding the wings of the spider to the rotary table to prevent its slipping around during the running of the casing. The second joint of casing in the string has been picked up in photo four and the spigot set in the bell while the crew waits for the blocks to stop swaying; a homemade gage of 2-in. by 4-in. lumber with a recess cut out for the bell is used to see that the joints are not badly out of line. In the fifth photograph the welder has tacked one side of the joint with the electric torch and is stepping around to do the same on the other side; after tacking, the welder runs successive beads to insure adequate strength. Before the manpower shortage two welders were normally used for welding the joints as this materially reduced the welding and rig time required for the job.

Surface casing is generally protected by cement to the surface and in addition the strings are comparatively short, being in the neighborhood of 200 to 1,000 ft. Compressive and tension stresses are not great and consequently fairly light casing of sufficiently large diameter can be used. Main purpose of the surface pipe is to protect the upper portion of the hole and to provide an anchorage for the blowout-prevention equipment. The surface pipe is seldom recovered from the hole and consequently it is desired to keep expense of this item to a minimum. Where high-pressure gas zones are likely to be encountered care is taken to see that the surface casing is strong enough to withstand any prospective pressures to which it might be subjected.

WHERE **BECKMAN** INSTRUMENTS ARE

Saving time Reducing waste Increasing yield

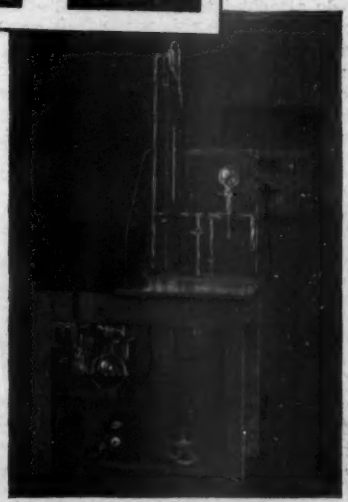
IN MODERN REFINERY PROCESSES



IN ALL THREE MAJOR WARTIME JOBS of the refining industry... aviation gasoline, toluene and synthetic rubber production... Beckman Instruments are key control instruments that are stepping up production, saving time and reducing waste. The above chart indicates a few of the important applications for these advanced instruments. If you are engaged in refining operations—or are interested in securing further information—write for complete details, outlining the specific application in which you are interested. *Beckman Instruments, National Technical Laboratories, South Pasadena, California.*

The Beckman Automatic pH Instrument incorporates many advanced features found in no other make or type of pH equipment. Permits accurate and continuous pH indication, recording and control to be maintained on process fluids, hot or cold.

The Beckman Quartz Spectrophotometer greatly simplifies the measurement and control of aromatics, butadiene and similar refinery products which are readily analyzed with ultraviolet light. Interchangeable light sources make it equally efficient for analyses in visible light regions. Compact, highly versatile!



The Beckman Infrared Spectrophotometer is the most advanced development for routine hydrocarbon gas analysis in refinery control. Analyzes gases by measuring the absorption pattern of infrared radiation. Fast, simple and highly accurate!

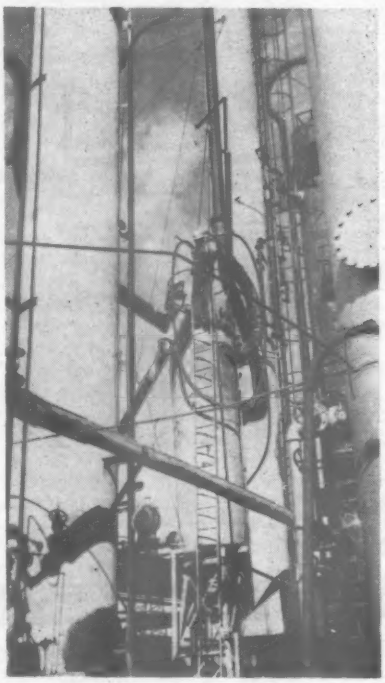
Beckman INSTRUMENTS SPEED PRODUCTION ...REDUCE WASTE

Shell and Tube Condensers Built To Be Cleaned During Operation

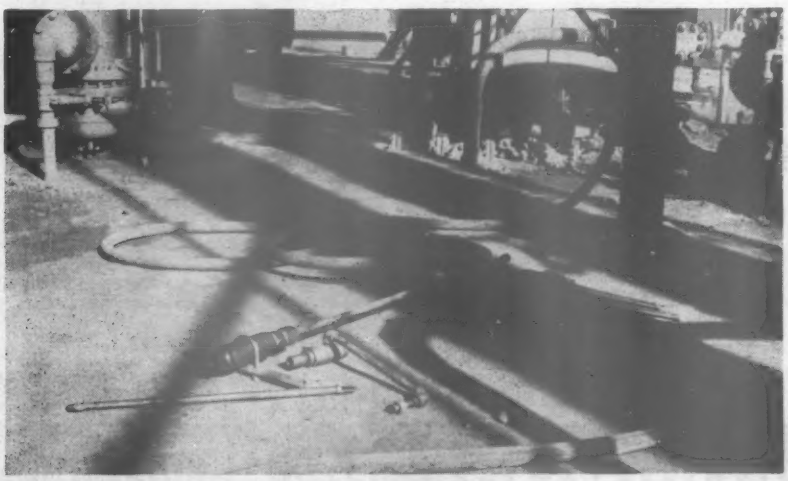
WHEN reconditioning its Dubbs licensed refinery to resume operation November 1943, Eagle Oil & Refining Co., Inc., Santa Fe Springs, Calif., found that several of the vapor condensers needed replacing. Not being able to obtain manufacturers' equipment in time to go on stream, the management decided to use what equipment was at hand to construct the necessary shell-and-tube units. The design of these condensers includes two tube sheets welded to the shell of the vessel so that the vapors from the fractionating columns would flow from top to base, which the water pumped to the shells entered below the bottom tube sheet and overflow through suitable piping at the top. This type of condenser enabled the welder to leave the top open so the water would return to the cooling tower at atmospheric pressure. Thus, the cooling tubes were in a position for easy cleaning, which has been done frequently without disturbing operation of the plant.

The condensers are mounted on pipe supports having ladders for workmen to reach the top where a working platform is located convenient for two men to stand on while operating the tube cleaners. A gin pole attached to the side of the cooling unit carries a small sheave on the cross piece through which a rope is run to support the major portion of the weight of the cleaning tools. Both water and air supply piping reach the top of the cooling units where hose is attached when removing the scale inside tubes.

Cleaning equipment included an air motor—which may also be used for "rattling" cracking-furnace tubes—and several short joints of hydraulic pipe having male and female couplings for flush joint connections. Cutting heads similar to oil-field fishtail bits have pins attached which connect to the box on the hydraulic pipe. A water head is frequently attached to the air motor between this unit and the first joint of pipe so that a stream of water under pump pressure can be discharged into the tubes through ports in the fishtail bits to facilitate removal of scale cuttings. The cleaning equipment is attached to a rope, or cable, supported by the sheave at the top of the gin pole, so the man operating the scaling tools can run the cutter up and down when reaching a heavy crust inside the cooler. The tubes are made of 1¼-in. seamless tubing so that the expansion and contraction under working conditions are similar to the shell and heads. Three months of operation with these condensers indicate that the cooling has been satisfactory, and that desired temperatures can be maintained by running the cutting tool through the tubes at any time condensate temperatures show a rise at the accumulator drums.



One of the shell and tube condensers being cleaned by using air-driven tools in vertical tubes while plant is in operation

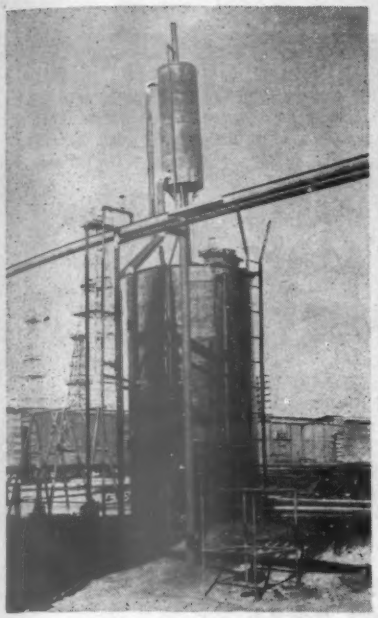


Air motor, water head, hydraulic pipe and fishtail bits used to clean condenser tubes while plant is in operation

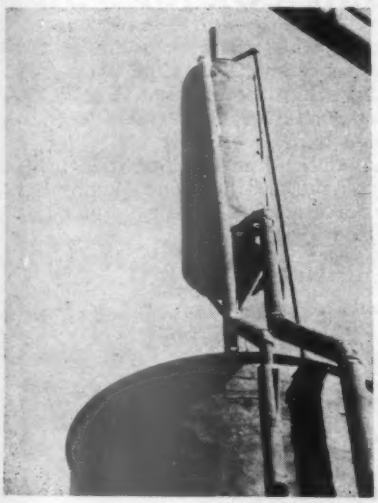
Elevated Tank Supplies Constant Head on Fuel to Boilers

OPERATING in an area where fuel gas may be shut off with a notice of only 1 hour, Eagle Oil & Refining Co., Santa Fe Springs, Calif., has equipped all furnaces and boiler combustion chambers with dual fittings, one for gas and the other for fuel oil. Either or both may be operated as the case may be. To maintain adequate temperature for free-flowing heavy oil and to maintain a constant head on the burners the company erected a fuel-supply tank with a superimposed smaller vessel, both insulated, and connected to a pump for constant circulation.

The larger vessel contains the working supply of fuel oil, replenished as frequently as necessary by the fireman who opens a gate valve on the line from the hot fuel from the evaparator. This is done only when using oil for fuel. While using natural gas in the various units, the oil burners are shut off, but the circulation of oil from the supply tank to the superimposed smaller vessel is continued so that the fuel may have the desired fluidity for almost immediate use. The small tank is set on an overflow pipe reaching almost to the top so that, no matter how long oil is pumped into it from the supply tank below, there is always an adequate amount under the proper temperature for use. The supply tank is fitted

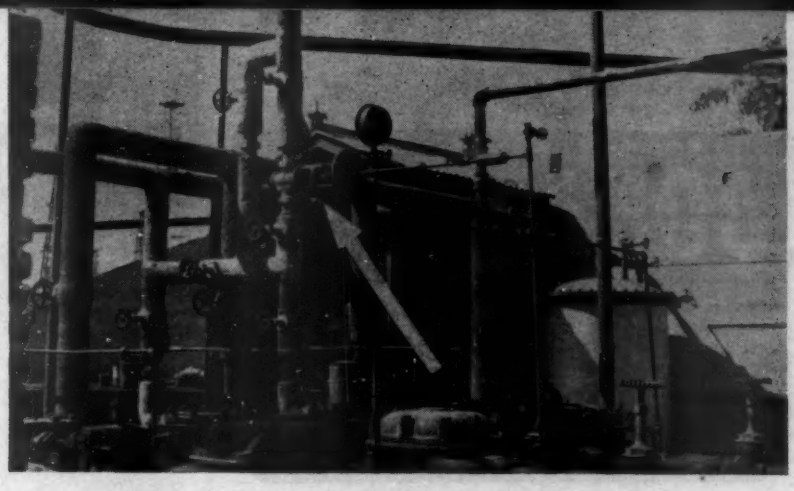


Refinery liquid fuel tank showing insulated vessel and superimposed smaller tank to supply a constant head to the burners



Pump feeder line, at left, which supplies fuel oil to top vessel, and burner supply line, right, which is under constant head. Extended line inside vessel is for overflow when pump supplies a greater amount of fuel than required for burners

with a steam heating coil in the base which discharges through sheath lines covering the fuel piping leading to the furnaces and boilers, so that the fuel in this piping never becomes cold. A manifold is attached to the circulating pump so that hot oil under pressure may be passed through the system shortly before changing over from gas to fuel oil in the burners. The elevated tank supplying oil at a constant head has been found to furnish a better flame than when the system was operated by forced circulation from the supply tank to the burner lines.



Looking across the battery of low-pressure boiler-feed pumps towards the single regulator which serves one or all three equally well

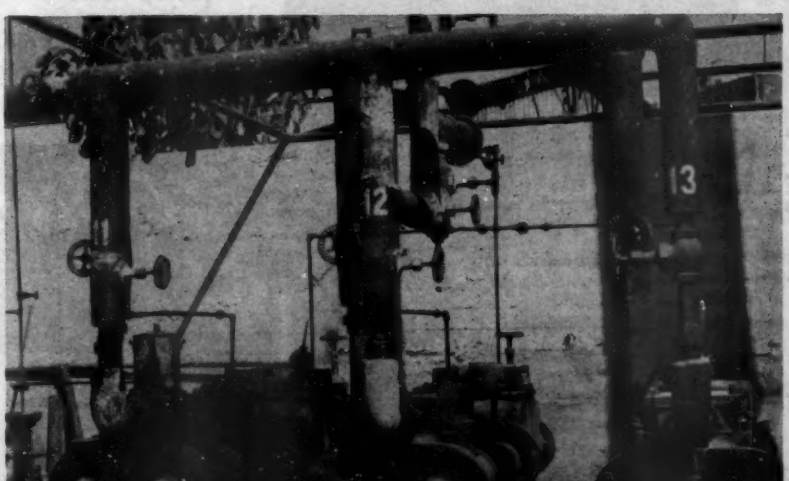
Dynagraph Controller Does Work of Three

CONTROLLING the operation of a battery of three low-pressure boiler feed pumps is being accomplished adequately by a large natural-gasoline plant with one instrument which can readily be used for one or more, or all of the pumps in the setting as operating conditions dictate. This installation replaces a setting originally built to include a separate controller for each individual pump so that the two removed from service could be employed elsewhere, since instruments and controlling equipment are difficult to secure under present war conditions.

The power manifold attached to this group of boiler-feed pumps is made of 2-in. pipe leading directly from the main header at the boilers. The feed line is equipped immediately above the middle pump with vertical connections for the diaphragm control valve, and also including the more or less conventional bypass around the instrument for emergency use. The steam line describes a 90° turn at the lower end of the diaphragm and bypass setting to continue on a horizontal plane to a point above the steam intake flange of the middle pump. A riser connected with a tee receives this line and carries it both below and above the point of contact. Above the tee, another fitting leads the line both ways to the outside pumps where other risers make connections with the steam intake flange of both these pumps.

Operating pressure from the boiler-feed line, which in turn is controlled by the boiler-feed water-level instruments, is transmitted to the diaphragm of the instrument on the pumps through a ¼-in. pipe line manifold. Individual collars welded into the discharge lines of each pump, between the discharge flange and the shut-off valves, receive risers which are connected to a common header terminating in a single line attached to the diaphragm valve head. An efficient shock absorber is inserted in this line between the cross tee and the diaphragm head to reduce pump pulsation to a minimum before shock is carried to the diaphragm and valve stem. Both manifolds are fitted with ground-joint lip unions so that repairs can be made, and hand-controlled globe valves installed for manual operation of the separate pumps when conditions are encountered making this form of operation essential.

Power, or steam, end of a battery of low-pressure boiler-feed pumps which are operated successfully with one steam-pressure regulator, the installation releasing two instruments for other operations elsewhere



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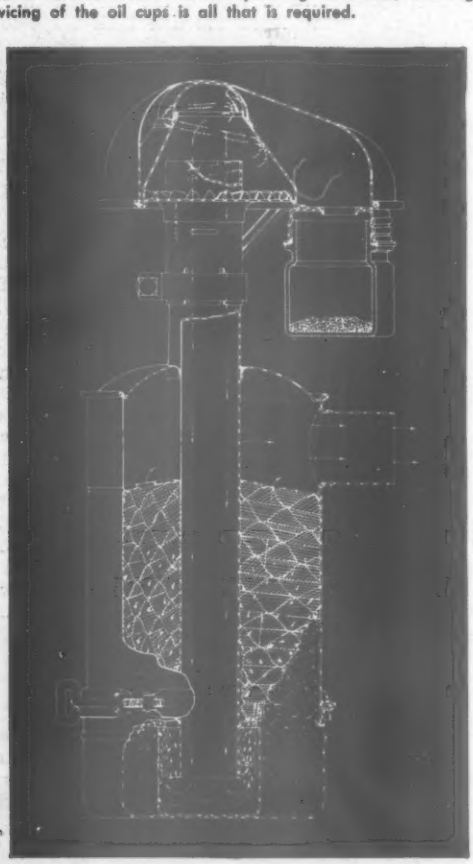
2. Cleaning is done by scrubbing: The element functions as a condensing chamber . . . not as a filter . . . thereby minimizing the possibilities of dirt becoming lodged in the element.
3. Ease of service: Under normal operating conditions, cleaning and servicing of the oil cups is all that is required.



4. Submerged air inlet insures displacement of oil and high cleaning efficiency regardless of load or operating speed.
5. One hundred per cent pressure tested.
6. For extreme dust conditions pre-cleaners can be provided to increase the time between service periods.

Our engineers will be glad to help YOU work out the best Donaldson installation for your product. Write us . . . no obligation.

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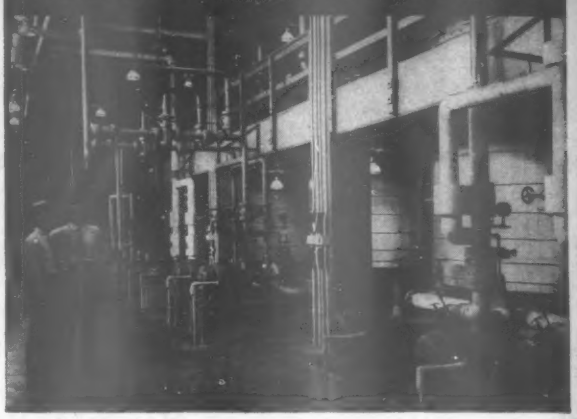
IN SYNTHETIC RUBBER PRODUCTION, TOO



IT'S GOULDS

"*the* PUMP FOR *the* JOB"

The manufacture of synthetic rubber requires the handling of tremendous quantities of liquids ranging from those containing a high percentage of solids to hydro carbons with specific gravity as low as .568 and at temperatures as high as 410° F.

Here's a tough liquid handling problem that in its entirety could not be met by any one pump, but only by "the pump for the job." Because of Goulds 96 years of specialized pumping experience, of manufacturing and engineering pumps only, it was logical that the engineers designing these plants should turn to Goulds for the pump "know how" that would solve their liquid handling problems. From a single source of supply they were able to obtain the right pump for many of the applications involved . . . the one pump that would do each job best . . . that would help them swing production of this vital war material into high gear in the shortest possible time.

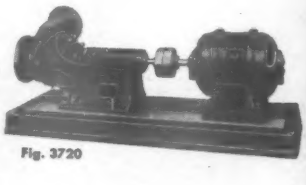


Fig. 3720

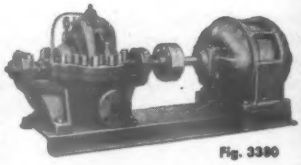


Fig. 3380

Typical Goulds Pumps used in the manufacture of Synthetic Rubber.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson

Consumption of Engine Oil

We are desirous of obtaining complete information regarding causes and contributing factors, particularly in respect to quality of oil which conduces to high engine-oil consumption in internal-combustion engines. References to technical literature and any other information will be greatly appreciated.—E. A. S.

With respect to spark-ignition engines the main and perhaps the only major cause of engine-oil consumption is a worn engine mechanism or ineffective wiping rings. In a minor way there are other factors or conditions that contribute to loss of engine oil but these, except in rare or almost inexcusable instances, do not cause much loss of oil. These minor factors overlap somewhat but may be stated as follows:

1. Low boiling or low viscosity oil.
2. Low flash oils (may be same as 1).
3. Excessively high engine temperatures.
4. Engine speed.
5. Leaks at gaskets and rotating seals.
6. Carburetor out of adjustment.

If an engine is badly worn and is badly coated with carbon, the oil tends to remain in the cylinder during the explosion and is blown out with the exhaust gases. In such operation the exhaust gases often appear black, although a black exhaust may also be caused by improper timing.

The consumption of oil is somewhat larger with low-viscosity oils than with high-viscosity oils. In one road test[1] the consumption of S.A.E. 10 oil was 1 gal. per 1,675 miles, whereas 1 gal. of S.A.E. 50 oil was consumed during only 794 miles of similar operation. Likewise Graves, Mougey & Upham[2] report the following miles per gallon for three weights of oils:

	Miles per gallon
S.A.E. 30 oil	406
S.A.E. 50 oil	562
S.A.E. 60 oil	707

And in another place an oil consumption of 1,500 miles per gallon for S.A.E. 10W and 2,500 miles per gallon for S.A.E. 30 is reported.

Low-flash-point oils are thought to be susceptible to loss from the crankcase and from the hot walls (or piston) of the engine. Poole[3] has been unable to locate a direct correlation of oil consumption and flash (or fire) point but he does suggest that there are indications of such a fact.[4,5] Oils of low-boiling range for a given viscosity, i.e., naphthenic (or aromatic) lubricants, and oils that by improper manufacture contain low-boiling constituents may be consumed somewhat more rapidly than high-boiling oils but no very conclusive evidence is at hand, and excessive losses have not been attributed to this cause. The rate of oil consumption as related to viscosity and volatility (boiling range) was covered by Graves[6] in the 1933 symposium on lubricating oils of the A.S.T.M.

The effect of engine speed and engine load (higher temperature) is discussed by W. S. James.[7] He finds that oil consumption at part and full load and at several speeds are as follows for a dynamometer setup:

OIL CONSUMPTION, MILES PER GALLON (APPROXIMATE)

Speed, r.p.m.	Part load	Full load
1,000		2,800
2,000	3,000	1,200
3,000	1,150	750
4,000	750	600

The early publication of Gavin and Wade[8] states that oil consumption can be explained by the content of low-boiling fractions in the oil and the temperature of operation, but that excessive oil consumption did not occur unless the engine mechanism was badly worn.

A sizable loss of lubricating oil occurs by plain leaks. Little statistical information is available but mute testimony is all about us in the way of spots and even pools on garage floors and drives.

Finally, a too-rich carburetor mixture can cause excessive oil consumption. This is an unexcusable condition but one that arose frequently before gasoline rationing was initiated. A white exhaust smoke is produced.

References

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Where to Introduce Steam in Bubble Tower

How much distillation steam should be used in a bubble tower and should it be blown into the liquid in the bottom of the tower or in the vapor space above?—S. V. P.

Theoretically the distillation or process steam should be introduced into the liquid because one extra contacting with steam will be accomplished by so doing. In practice there are several reasons for putting the steam into the vapor space above the liquid, and this is the common practice in most refineries. When steam is introduced into the liquid it may disturb the level and flow from the bottom of the vessel. If the steam is not entirely dry, the slugs of water when introduced into the liquid cause a violent boiling or foaming which is akin to a small explosion. Much less of a disturbance is created if the steam is put into the vapor phase.

The amount of steam that should be used is a more complicated question. Fundamentally, the amount of steam is dependent on the degree of stripping that is desired, i.e., upon the flash point desired in the finished product. As a most general average, the amounts of steam used in strippers is given in Petroleum Refinery Engineering, page 372, McGraw-Hill Book Co., New York, as follows:

Material—	Lb. steam per gal.
Naphtha	0.1-0.2
Kerosene	0.2-0.3
Gas oil	0.3-0.6
Fuel oil (topped crude)	0.4-0.8
Pressure distillate bottoms	0.6-1.0

If particularly high flash points are required, even larger amounts of steam are required even up to 2.25 lb. per gal.

Although the computation of the amounts of steam required for stripping petroleum products is complicated and subject to many assumptions, the following are computed values for kerosene, when using four actual stripping plates:

Per cent of material boiling below 385° F. removed	Pounds of steam required per gallon	Approximately flash point of product* (Cleveland, O.C.)
10	0.06	90
30	0.17	
50	0.30	125
80	0.66	
90	0.93	
95	1.37	155

*See W. L. Nelson "Flash Tests Useful for Judging Application of Light Oils," The Oil and Gas Journal, Sept. 1, 1938, p. 42.

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Following is a partial list of the equipment included with this boiler plant: Steel frame building, 32' x 44'; two steel stacks, 4' x 65'; two 160 lb. working pressure Heinie Type Water Tube Boilers with suspension steel and earthquake bracing, two 7 x 4½ x 10 Union Duplex boiler feed pumps; two Leahy Multijet gas burners (easily converted to oil) with automatic draft regulator; automatic water level regulators; steam flow meter; continuous blow down; all necessary pipe lines and fittings required for assembly and immediate operation. Further details are yours for the asking.

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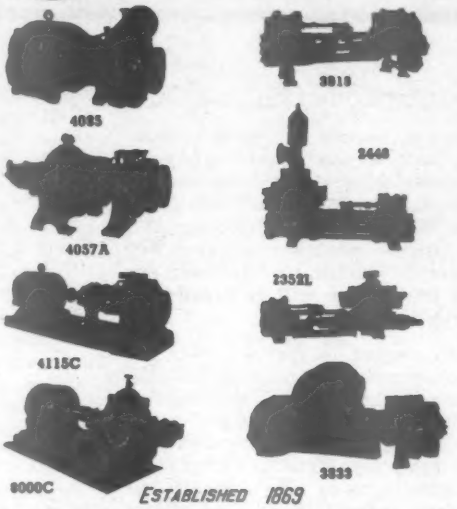

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Well Spacing—Its Effect On Recoveries and Profits

The paper, of which this article is a greatly abbreviated summary, represents an exhaustive study of the subject of the relationship of oil recoveries to well spacing. The authors openly question the validity of arguments for wide spacing of wells. They do not stand against the adoption of improved production practices but state that in attempts to obtain greater recoveries, the possibilities of close spacing should not be ignored.

IN a treatise on "Well Spacing—Its Effect on Recoveries and Profits," appearing currently in the Bulletin of the American Association of Petroleum Geologists, the authors, Stuart K. Clark, assistant chief geologist, and J. S. Royds, valuation engineer, Continental Oil Co., Ponca City, Okla., and C. W. Tomlinson, oil producer, Ardmore, Okla., draw the following three basic conclusions:

1. That well spacing does affect the recovery of oil from a reservoir; that increased well density results in increased recovery; and that within practical limits there is a definite mathematical relationship between well spacing and the recovery.

2. That arbitrary wide-spacing regulations impose definite handicaps on the adequate exploitation of small accumulations on sharp folds or against faults, and tend to increase the ratio of dry holes to producers in all cases.

3. That even from the standpoint of cost per barrel of crude recovered and of profit per dollar expended, it is not invariably true that the wider of two spacings is the more economical. For a given set of conditions there is a certain spacing which is the most economical one, and either a closer or a wider spacing will involve higher unit costs and lower unit profits.

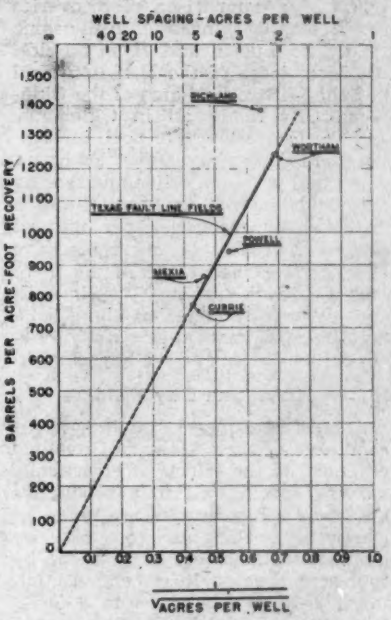
"While nothing herein is to be construed as an argument against the adoption of improved production practices in an attempt to obtain greater recoveries at lower costs, it would appear that a simple and highly effective method is being neglected when the possibilities of close spacing are ignored," the authors stated.

Discussions of the authors were intentionally limited to sand and lime or dolomite reservoirs whose physical characteristics are such that they behave like sands; i.e., that oil movement is through capillary openings. They assumed that an accumulation of oil in a true cavern might be drained by one properly located well.

The Woodbine sand, fault-line fields of East Central Texas were presented as evidence. Unit recoveries from these fields are highly significant, the authors said, because they represent a group of fields in which (1) the producing horizon is the same, (2) structural conditions are essentially the same, (3) the character of the oil is essentially the same, (4) the variation in depths and pressures is slight, (5) all were exploited in the same manner with rapid development and wide-open flow, (6) all were subject to natural water drive, (7) all are so nearly depleted that there is no chance for errors in the estimates of ultimate recovery to have any appreciable effect on the results, and (8) the average well spacing varies through a relatively wide range among the fields.

The essential data concerning these fields are shown in Table 1. In it, according to the authors, it is evident that the unit recoveries from the more closely drilled fields are greater than from the less densely drilled ones. The recoveries line up in exactly the order of well density except for the two most closely drilled in which instance the difference in density amounts to only 0.2 acre per well. Also indicated is that the recoveries are proportional to the reciprocal of the square root of the area attributable to each well (acres per well) and that the ratio of the two is almost constant for this group of wells.

This mathematical relationship also is shown on the chart (Fig. 1) in which recoveries per acre-foot of pay and the reciprocal of the square root of the acres per well are used as coordinates. The data for the Wortham, Mexia and Currie fields fall almost in a straight line, the projection of which passes through the zero point of the two scales. The Powell field point falls only slightly below



WELL SPACING-RECOVERY CHART

Fig. 1: Illustrating the relation between well spacing and recovery in certain specific instances

TABLE 1—DATA ON MEXIA-POWELL FAULT-LINE FIELDS, TEXAS

Field—	Currie	Mexia (fault leases)	Powell*	Richland	Wortham
Production area, acres	435	1,820	2,600	234	760
No. wells	75	391	741	99	354
Spacing, acres per well	5.8	4.7	3.5	2.4	2.2
Pay thickness, ft.	20.9	56.9	46.5	20.1	24.8
Pay volume, ac.-ft.	9,092	103,543	120,813	4,701	18,868
Prod. to 1-1-42, bbl.	6,645,460	85,700,000	109,972,041	6,398,020	22,741,106
Est. ultimate prod.	7,000,000	89,500,000	113,500,000	6,500,000	23,500,000
Est. ultimate recovery:					
Bbl. per acre	16,092	49,179	43,654	27,771	30,921
Bbl. per ac.-ft.	770	864	939	1,383	1,245
Percentage†	43.6	48.0	53.2	78.3	70.5
Reciprocal of sq. root of acres per well	0.412	0.460	0.535	0.644	0.675
Ratios‡	1,870	1,880	1,750	2,150	1,850

*Includes Woodbine sand production only. †Based on estimated original oil content of 1,766 bbl. per acre-foot. ‡Unit recoveries to reciprocal of square root of spacing.

this line. Only the Richland field point lies appreciably out of line. The meaning of the relationship indicated on the chart may be made clear with the aid of the "Well Spacing-Acres Per Well" scale at the top. The unit values on this scale represent an inverted diminishing series approaching the zero of the horizontal scale as the spacing approaches infinity. Then, if a straight line passing through the zero point represents all the variations in the recovery from a given reservoir, or from identical reservoirs, for all possible variations in well spacing, other factors being equal, it means that as well spacing increases, unit recoveries decrease in inverse ratio to the square root of the spacing, and that as the spacing approaches infinity the unit recovery approaches zero.

Further support for these conclusions is given, according to the authors, by a comparison of recoveries by different spacings within the same field. The Lucien and Hewitt fields, the Ideal lease of the Healdton field and the Wilcox sand area of the Oklahoma City fields, all in Oklahoma, and the Chase townsite pool, in Kansas, were cited as examples. Each was developed with more than one spacing pattern being followed, and in each instance the recoveries per unit of the more densely drilled areas have been greater than those in the more widely spaced sections. Also, in each case it was shown that there is a definite mathematical relationship between recoveries and well spacing.

Oklahoma City Field

Studies of recoveries in the Wilcox sand area of the Oklahoma City field extended to the effects of erractically varying spacing within a productive area, and comparisons were made by computing spacing and recoveries by quarter sections, grouping them by four-acre spacing increments as follows: Zero to 4 acres, 4 to 8 acres, 8 to 12 acres, and over 12 acres, and averaging the spacing and recovery per acre-foot for those groups. This made comparisons directly applicable to widely varying reservoir conditions within the field as a whole.

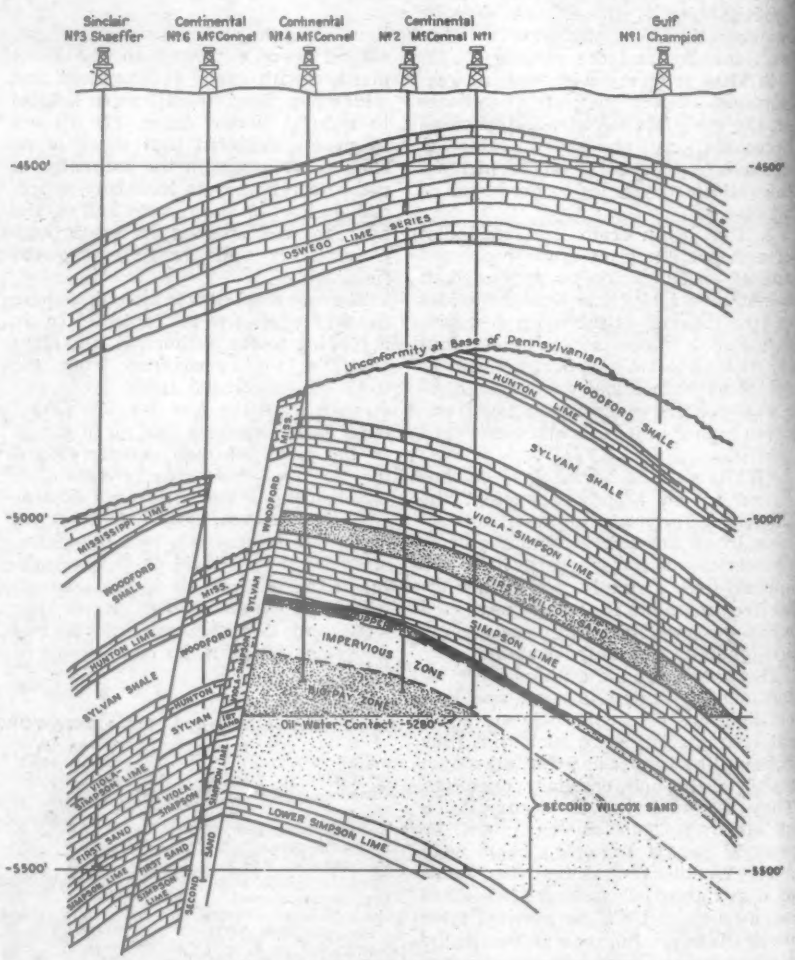
Recoveries for these 4-acre increments range from 325 bbl. per acre-foot for a spacing of 13.25 acres per well, to 1,315 bbl. per acre-foot for a spacing of 3.25 acres per well for the entire Wilcox area. Individual quarter sections show an even higher range.

It is indicated by this that for intrafield spacing groups the more closely spaced wells tend to be benefited, and the more widely spaced ones penalized to a greater extent than would be expected from the interfield comparisons.

Probably a substantial part of the increased loss accompanying wider spacing, the treatise stated, may be attributed to the fortuitous location

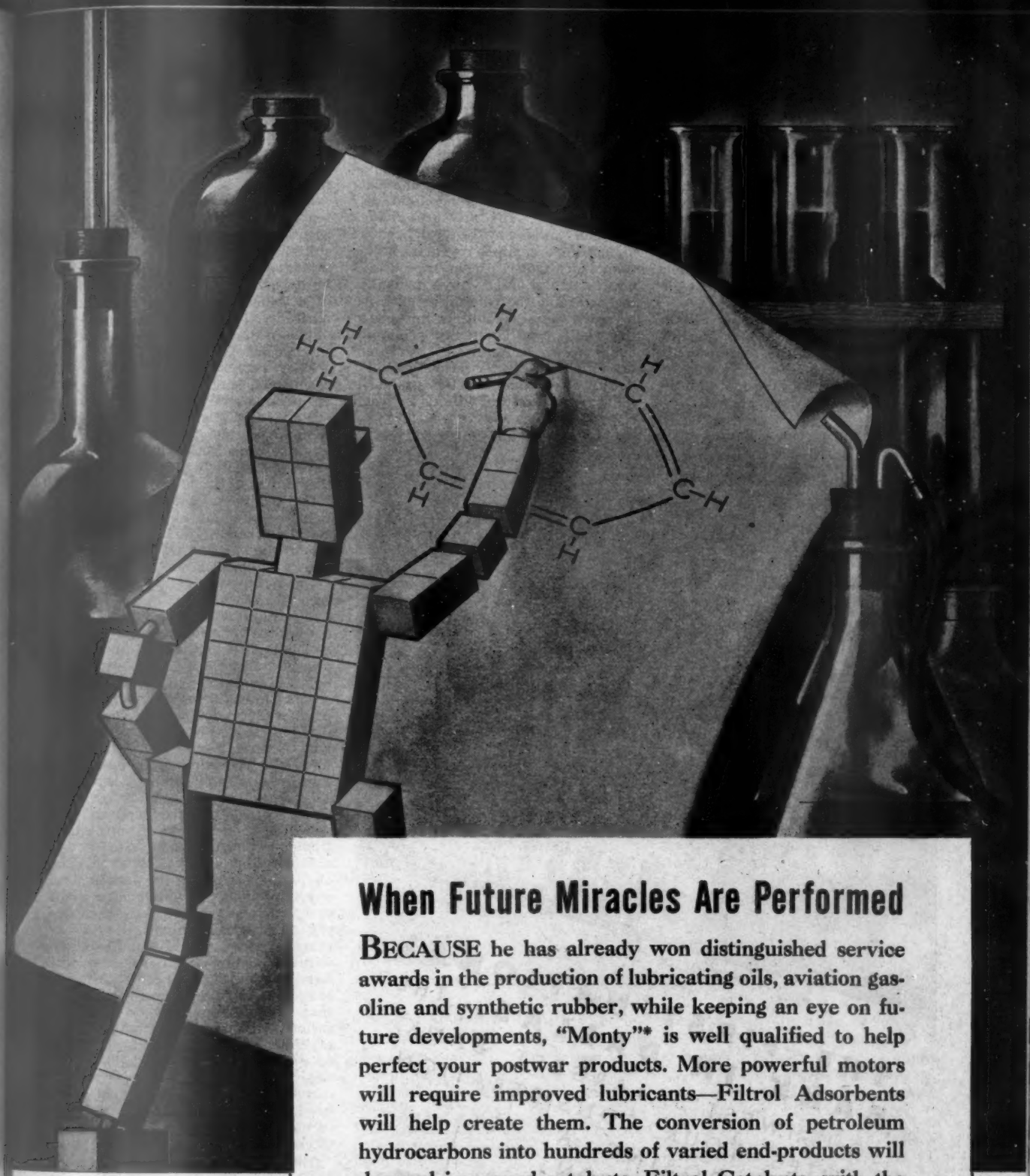
TABLE 2—COMPARISON OF EFFECTS OF VARIOUS WELL SPACINGS

Item—	40 acres	20 acres	10 acres	5 acres
No. acres in productive area	1,600	1,600	1,600	1,600
Sand thickness (average)	35	35	35	35
Recoveries:				
Per acre-foot	175	250	350	500
Per acre	6,125	8,750	12,250	17,500
Total	9,800,000	14,000,000	19,600,000	28,000,000
Net oil to 7/8 W.I.	8,575,000	12,250,000	17,150,000	24,500,000
Price (net after production tax)	$1.20	$1.20	$1.20	$1.20
Gross W.I. revenue	$10,290,000	$14,700,000	$20,580,000	$29,400,000
Costs: Finding and acquisition at $1,000 acre	1,600,000	1,600,000	1,600,000	1,600,000
Development (No. wells)	40	80	160	320
Wells at $30,000 each	$1,200,000	$2,400,000	$4,800,000	$9,600,000
Dry holes (six) at $17,500	105,000	105,000	105,000	105,000
Other facilities at $300 per acre	480,000	480,000	480,000	480,000
Total development	$1,785,000	$2,985,000	$5,385,000	$10,185,000
Lifting costs per bbl.	0.25	0.188	0.147	0.118
Total	$2,450,000	$2,632,000	$2,881,000	$3,304,000
Total costs	$5,835,000	$7,217,000	$9,866,000	$15,089,000
Net profit	4,455,000	7,483,000	10,714,000	14,311,000
Cost per net bbl.	0.68	0.589	0.575	0.615
Profit per dollar of costs	0.763	1.03	1.08	0.948



EAST-WEST CROSS SECTION, CRESCENT POOL, OKLAHOMA

Fig. 2: Showing limited extent of "Big Pay Zone" in the second Wilcox sand. Neither of the two rows of 10-acre wells indicated would have been drilled under original 40-acre pattern for field, and this pay would have been overlooked



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of the drill holes in the reservoir with respect to the areas of exceptionally high porosity and permeability in sandstones or the naturally developed drainage channels in limestones or dolomites. All reservoir rocks vary laterally in some degree, and, as a consequence, individual wells vary greatly in their productive capacities. One well will often yield as much as a half dozen of its neighbors.

"The odds against tapping all the local 'sweet spots' naturally increase as well spacing widens, and no doubt that fact is reflected in the lower average recoveries per acre-foot indicated for more widely spaced wells."

Another reason for losses attributed to wide spacing is that pressure gradients along any radius through a producing well are steep in the immediate vicinity of the hole and flatten out rapidly with increased distance from it. The pressure divides between wells may be visualized as almost imperceptible reversals rather than sharp ridges. In the case of exclusively solution-gas-drive fields it is inconceivable that the oil along these pressure divides could be moved to the wells by the energy originally available in the reservoir. In water-drive fields, a greater recovery should be expected than in the gas-drive fields, but pressure divides between wells will still exist, and movement of the water toward the wells will tend to be along the steepest pressure gradient and accordingly the shortest line.

Lobes in the advancing water front tend to become further accentuated as production continues, with the result that some oil along the pressure divides would presumably eventually be bypassed entirely even in an ideal sand with uniform porosity and permeability. Lateral and vertical variations in the reservoir rock aggravate the matter of bypassing.

That repressuring by cycling of casinghead gas, the introduction of gas from extraneous sources, or the use of artificial water drive can wholly eliminate the effect of well spacing was questioned. Also, the opinion was expressed that "within certain practical limits there is no reason to assume that the adoption of a more efficient production method would not effect an increase in recovery regardless of the existing well spacing."

It was pointed out that the total volume of oil originally present in the reservoir constitutes the final limit which all efforts toward increased recovery can only hope to approach, and as this limit is approached further appreciable increases in recovery cannot be expected from either closer spacing or refinements in production practices. A close approach to the limit is indicated at Wortham, one of the East Central Texas Woodbine fault-line fields previously mentioned, with a recovery of 1,245 bbl. per acre-foot. This recovery has been made with a spacing of 2.2 acres per well and under wide-open-flow conditions which frequently have been branded as inefficient and wasteful. It should be obvious, according to the authors, that any improvement in production practice which can demonstrate a recovery equal to that obtained at Wortham from a sand of equal porosity with decidedly wider spacing, will have eliminated any need for consideration of any closer spacing than that then used. Unless they do result in recovery comparable to that obtained at Wortham, porosity and other factors considered, no production practices applied to widely spaced wells can be said to have eliminated all need for considering the possibilities of obtaining additional oil by means of closer spacing.

The decline in the average size of field discovered during recent years, coupled with arbitrarily imposed wide spacing patterns which now generally prohibit drilling more than one well to 40 acres, has created additional problems which cannot be ignored in any study of the economic effects of well spacing, the authors stated. One of these is the problem of obtaining locations actually capable of draining structurally controlled accumulations in fields of small areal extent, such as narrow accumulations against

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faults and sharply folded anticlines and small domes.

The second Wilcox sand production of the Crescent field, Logan County, Oklahoma, was given as a pertinent example. This structure is a narrow, sharply folded and faulted anticline. The sand includes an upper and a lower pay zone, separated by a tightly cemented, practically impermeable zone (Fig. 2). The lower "pay" is much narrower in extent than the upper but is of exceptional caliber. Development in proving up the upper pay zone was initiated on a 40-acre spacing, but subsequently was changed to a 10-acre pattern. It has turned out that only two rows of 10-acre locations along the crest of the structure have produced from the prolific lower pay zone, and these are such that if the original 40-acre spacing had been adhered to, that zone, which has accounted for more than half the field's total production, would never have been tapped (Fig. 2).

Wide spacing, it was pointed out, also increases the ratio of dry holes to producers drilled in development of a given field. As field area diminishes, that ratio tends to increase, well spacing being constant. With decreasing field size and increasingly wider well spacing, a large increase also is inevitable in the percentage of total footage drilled which goes into the unproductive holes required to determine the limits of the field. If one well will not effect the same recovery that a number of wells will from a reservoir, regardless of size, then there is a definite loss involved in the increasing percentage of dry-hole footage which serves to offset or cancel out a part of the apparent saving in development cost accredited to wider spacing.

An analysis of the effects of various well spacings in terms of overall costs and profits and in costs per net barrel of oil recovered and profits per dollar of total costs is presented in Table 2, a hypothetical case based on assumptions as to field size, sand thickness and productivity, well costs, etc. In this it has been assumed that the dimensions of the productive area are such that it can be exploited by any of the spacings indicated. The analysis indicates that from the standpoint of costs per net barrel of oil recovered and profits per dollar expended, the 10-acre spacing has the advantage over either the 20 or 40-acre spacings, and it is only when the density of a well to 5 acres is reached that the additional oil recovered involves the penalties of higher unit costs and decreased profits per dollar of costs.

Discussions of the effect of well spacing on profits in recent years have for the most part assumed, the authors explained, that recovery would be independent of spacing and consequently that reduction in development cost effected by widening the spacing is all net saving. If this were literally true, they said, there would be no justification for drilling more than one well in the smaller fields.

There also has been a tendency, they said, to focus attention upon development costs (in terms of cost per producing well only) and profits per dollar invested (with the same restriction as to investment items.) This, they pointed out, gives a distorted picture and is heavily "loaded" to favor wide spacing since "development cost," figured on a flat price per well, increases in direct ratio to the number of wells drilled; whereas the recovery of oil increases only in proportion to the square root of well density, expressed as acres per well.

It also was mentioned that in studies of the economics of well spacing there had been a tendency to ignore the cost of finding and acquiring each productive acre. This in turn has given an additional distorted picture in favor of wide spacing. When this cost, and various other factors are considered, they said, the benefits of closer spacing become more apparent, and since more wells mean increased recovery, there should be a strong incentive to work toward lower development costs by utilizing every expedient to reduce the cost of the individaul well rather than by widening the spacing.

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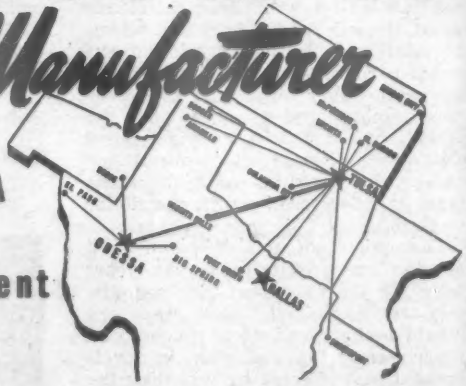

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Engineering Fundamentals No. 125

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

WALL-BUILDING PROPERTY OF MUD

A GOOD rotary-drilling mud should form a thin, tough, impervious sheath of plaster on the walls of the hole already drilled by the bit. A mud that will do this is said to have a good wall-building property.

The plaster formed on the walls must be as nearly impervious as possible so that the rate of water filtration from the drilling mud into the formations will be low. It is particularly desirable to reduce the amount of water filtration to the minimum possible value when drilling a stratum from which, at some later time, an attempt may be made to produce oil and gas. Presence of drilling water decreases the effective permeability of the sand to flow oil or gas. Since the greatest part of the flow resistance exists immediately adjacent to the well bore, it is particularly objectionable that the infiltered water be present in this region.

Often the productivity of a well may be permanently reduced as a result of infiltration of water into the formation from a mud having a poor wall-building property. Such damage is permanent because the water may not be completely removed by the flow of oil and gas into the well bore when the well is placed on production. The damage caused by this filtered water is most serious in zones of relatively low reservoir pressure, where the high differential pressure necessary to purge the sand of the water cannot be obtained, regardless of steps taken after the water has once entered the zone.

The presence of the filtrate makes electrical logs less reliable, since the readings obtained depend primarily upon the fluid content of the strata immediately adjacent to the well bore. Flushing and contamination by infiltered water also tend to reduce the reliability of side-wall cores and even of cores obtained by conventional coring methods. Drill-stem tests often give unsatisfactory results because of the great amount of drilling water produced. In many instances, an excessive amount of caving can be directly attributed to the wetting and softening action of infiltered water on shale. The swelling type of heaving shale, if it can be drilled at all, must be drilled with a mud which has a very low water loss.

The plaster formed on the wall of the bore hole must be tough, rather than flaky or brittle, in order to maintain a continuous covering on the wall in spite of a tendency of the drill pipe, tool joints, bit, and other hole equipment to break it or remove it during rotation or during a trip.

The filter cake must be reasonably thin in order that excessive pump pressure will not be required in circulating mud fluid between the drill pipe and the hole; and in order to prevent difficulty in removing pipe from, or running it into, the hole.

Experience has shown that one of the principal factors which control the wall-building property is the range of particle size. Wall building is essentially a bridging of the exposed pore openings on the wall of a well. Relatively coarse mud particles may be required to start the bridging of the pores. To start a bridge across a pore requires particles with a diameter about one-third that of the pore. To effectively reduce water filtration, the space between the relatively large grains must be bridged with smaller particles; and between these smaller grains, still finer ones are needed. The finest particles should be extremely small, even approaching the size of a water molecule.

Some natural-clay drilling fluids do not contain a sufficiently large proportion of the extremely fine particles. The addition of bentonite usually increases the proportion of such particles and reduces the filtration loss.

Chemical dispersing agents are widely used for improving the wall-building property. Such chemicals have about the same effect as adding fine colloidal particles, since their action consists of decreasing the effective size of particles by breaking up aggregates of individual colloidal particles.

The wall-building property is often destroyed, or adversely affected by contamination of the mud with cement, salt, lime, or anhydrite. This adverse effect is often recognizable by an accompanying change in viscosity; or it is easily detected and accurately measured by means of a filter test to be described in the next installment of this series. The undesirable effect caused by salt, cement, lime, and anhydrite is attributed to the fact that such substances flocculate* the particles of the colloidal suspension. Such flocculation is thought to be equivalent to replacing the fine particles with coarser particles. In this way, the gaps between the particles are enlarged which allows the water to filter through more easily.

The rate of water loss from a mud is generally greater at higher temperatures. This can be attributed to two main causes, namely, the decrease in viscosity of water accompanying an increase in temperature and the greater degree of flocculation of the colloidal particles at elevated temperatures.

Experiments have shown that thicker filter cakes are formed opposite the more permeable strata.

Generally speaking, the mud viscosity and gel strength should not be too high, or else the filter cake formed will be too thick and not securely bonded to the wall of the hole.

One aspect of the rate of water filtration from a mud is often overlooked, viz., better drilling progress can be made, in some wells, if the water loss is not kept too low. The desire of a driller to keep plenty of water in his mud in order to make rapid progress is well founded. If the water loss is high enough to allow water to penetrate and partially disintegrate the formation before the bit reaches it, drilling will be more rapid. This is especially true of shales. In drilling such formations, where there is no probability of oil production, it may be desirable to allow the water loss to run somewhat higher in order to drill the maximum amount of hole per unit of time.

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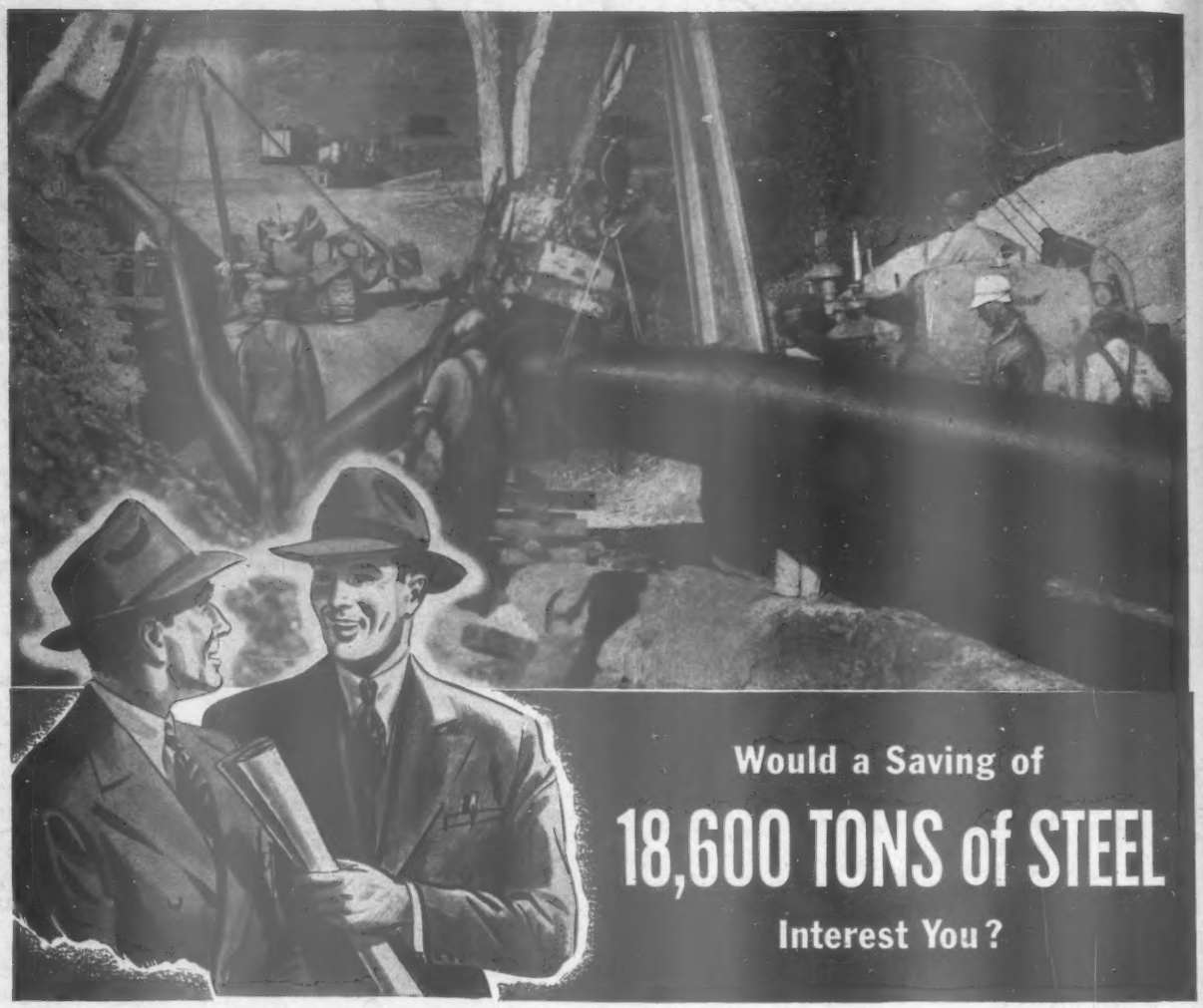
*For practical purposes the word flocculate means to cause the colloidal particles to "flock together."

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma



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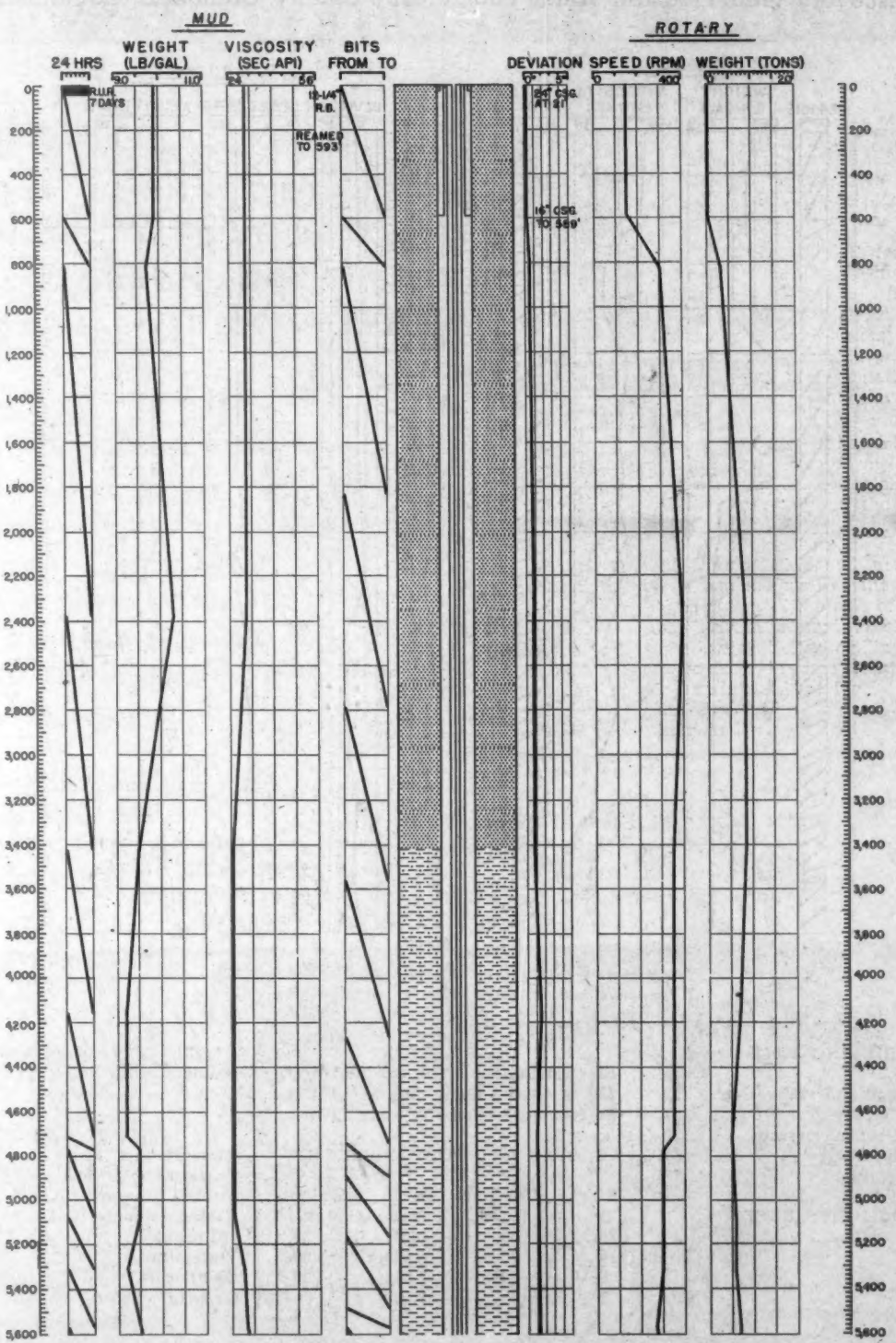

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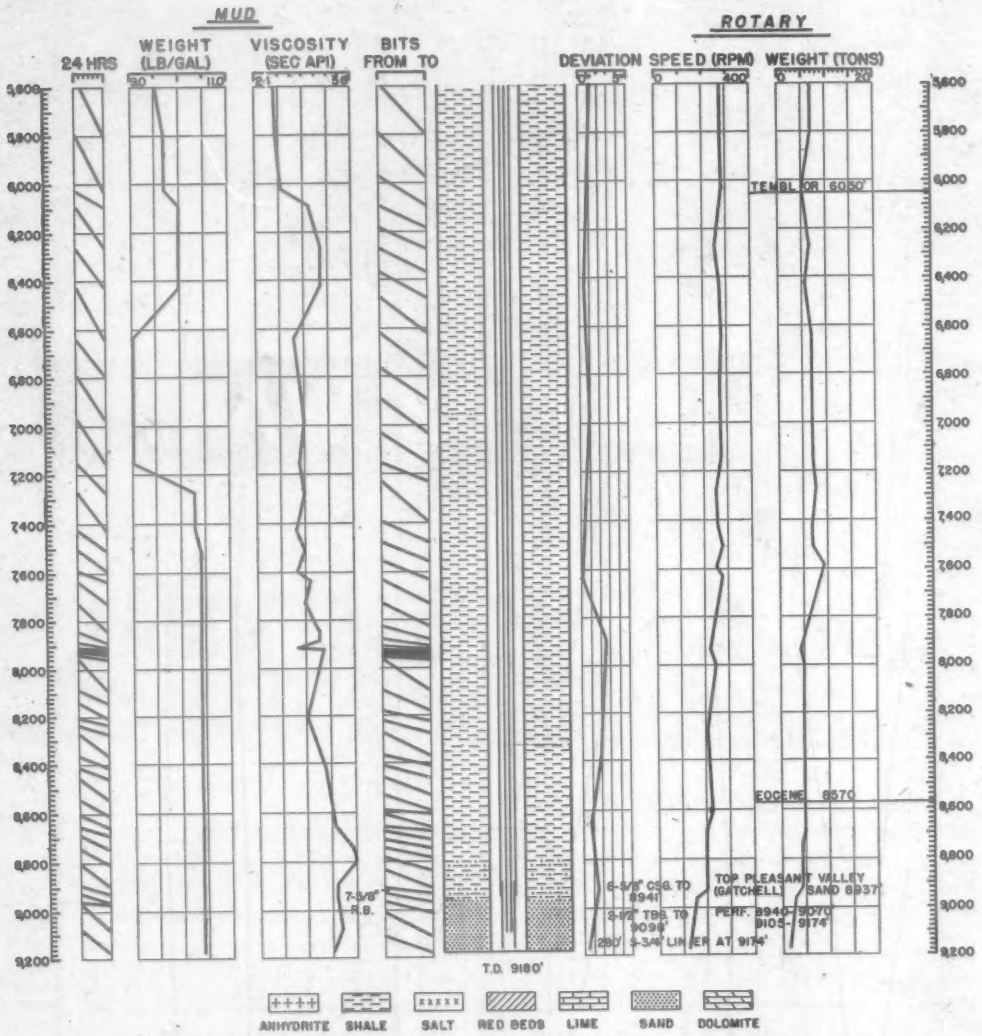
Journalog

Discovery Well, Pleasant Valley Pool, Fresno County, California (Continued)



DRILLING TIME

	Days
Complete road and excavation	13
Rigging up rotary	7
W.O.C. and setting casing	10
Days drilling, rotary	67
Total rotary time	77

ROCK BITS USED

Number	Size (in).
58	12¼
3	7⅞

COMPLETION

Electric log 589-8,970, 8,970-9,175 ft.
280 ft. 5¾-in. liner hung at 9,174 ft.
Perforated 8,940-9,070, 9,105-9,174 ft.

CASING AND TUBING RECORD

Size (in.)	Weight (lb./ft.)	Depth (ft.)	Cement (sacks)
24	....	21	25
16	75.00	589	600
8⅝	38.43	8,941	1,000
2½	....	9,098	....

MEDIUM-HARD CORE HEADS

Number	Size (in.)
3	8½

PRODUCTION TEST

Time flowed (hr.)	20
Surface choke (in.)	3/32
Tubing pressure (lb.)	1,075
Casing pressure (lb.)	1,500
Oil (bbl.)	332
Water (bbl.)	3
Gas (cu. ft.)	222,000
Gravity	28.9

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REED *Super Shrink-Grip* TOOL JOINTS FOR INTERNAL UPSET DRILL PIPE
FULL HOLE

SIZE	Tool Joint Dia. O.D.	Tool Joint Dia. I.D.	Tool Joint Length Approx.	Diameter of Upset Drill Pipe: Diameter of Land	Diameter of Upset Drill Pipe: Inside Diameter
*2⅜"	4"	1⅞"	17"	3"	1 11/16"
3½"	4¼"	†2 1/16"	18"	3½"	2⅛"
4"	5⅛"	2 11/16"	20"	4⅛"	2 11/16"
4½"	5⅝"	13"	20"	4½"	3⅛"
5⅛"	7"	**3 11/16"	22"	5 11/16"	4"
6⅝"	8"	5"	24"	6⅝"	5"

Note: Acme Full Hole can be Furnished in Sizes: 3½"–4½" and 5⅛".
* Reed Full Hole. Not A.P.I. Standard. † 2 11/16" or 3⅛" Optional.
** 4" Optional. ‡ 1¾" Optional.

SEMI-INTERNAL FLUSH

SIZE	Tool Joint Dia. O.D.	Tool Joint Dia. I.D.	Tool Joint Length Approx.	Diameter of Upset Drill Pipe: Diameter of Land	Diameter of Upset Drill Pipe: Inside Diameter
3½"	4¼"	2⅛"	18"	3½"	2⅛"
4½"	6"	3⅛"	20"	4½"	3⅛"

Note: The Tool Joint Box and Pin Connections have 4 A.P.I. Threads per Inch, with Larger Pin Diameter than A.P.I. Full Hole.

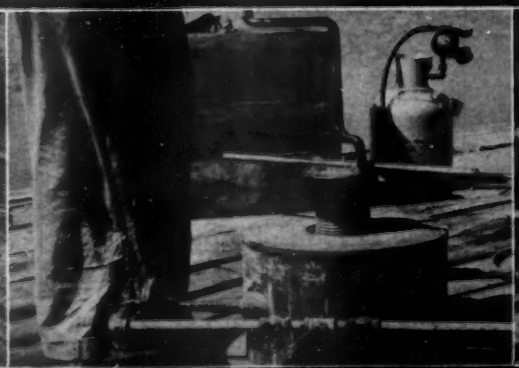
REED *Super Shrink-Grip* TOOL JOINTS FOR INTERNAL FLUSH DRILL PIPE

SIZE	Tool Joint Dia. O.D.	Tool Joint Dia. I.D.	Tool Joint Length Approx.	Diameter of Upset Drill Pipe
2⅜"	4 1/16"	2 1/16"	17"	3 1/16"
3½"	4⅝"	2 11/16"	18"	3½"
4"	5⅝"	13"	20"	4½"
4½"	6½"	3⅛"	20"	5⅛"
5⅛"	7¾"	4 11/16"	22"	6⅝"
6⅝"	8¾"	5 11/16"	24"	7⅛"

† 2 11/16" or 3⅛" Optional.

WHEN REPLACEMENTS ARE NECESSARY

SIMPLY CUT OFF THE OLD TOOL JOINT



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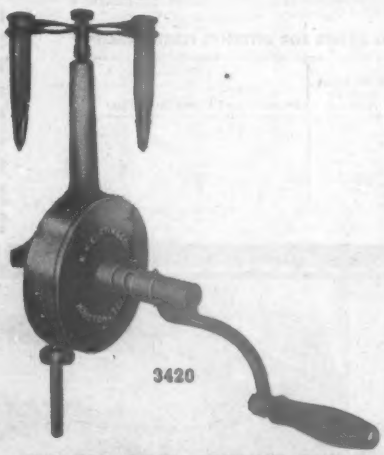

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REFINING

Hinds Is Head of Danciger's Reopened Longview Plant

LONGVIEW, Tex.—James C. Hinds, formerly general superintendent for Southport Petroleum Co., will be superintendent of Danciger Oil & Refining Co.'s refinery here, which, according to present plans, will resume operation next month, following a long shutdown. The plant, to be placed on stream again at the direction of Petroleum Administration for War, is being remodeled. It has daily capacity of 7,000 bbl. and, it is understood, will produce 73 and 87-octane gasoline for use of military training camps.

Danciger has bought 200,000 bbl. of East Texas crude from Humble Oil & Refining Co., and this is to be delivered at the rate of 20,000 bbl. daily. PAW, it is reported, has made arrangements for the daily delivery of 6,000 bbl. of East Texas crude to the plant after operation has started. This oil, it is said, has been going into the big-inch line.

Carter Adds to Its Refining And Marketing Facilities

BILLINGS, Mont.—Sale of its properties, including a 1,500-bbl. refinery at Newcastle, Wyo., and marketing facilities in Wyoming, North Dakota, South Dakota, and Nebraska, to Carter Oil Co. by Consumers Oil & Refining Co., is announced by P. N. Fortin, president of Consumers. The refinery operates on crude from the Osage and Mule Creek fields.

This transaction follows a recent one in which Carter acquired the Yale Oil Corp. properties from essentially the same interests. Carter through these and earlier purchases now has plants at Cut Bank, Billings, Newcastle, Lowell, and Worland, with total refining capacity of 17,200 bbl. daily.

West Texas Oil Analyzed in New Bureau of Mines Report

WASHINGTON, D. C.—Analyses of crude oils from 43 West Texas fields have been compiled by the Bureau of Mines to facilitate the possible use of these crudes by refiners who customarily employ Mid-Continent oil as charging stock.

Fields covered in the bureau's summary are: Apco, Big Lake (Queen), Big Lake (dolomite), North Cowden, Crane-Cowden, Dune, Embar-Ellenburger, Foster (Big lime), Foster (dolomite), Fuhrman, Fullerton, Goldsmith, Harper, Hendrick, Howard-Glasscock, Iatan-East Howard, Jordan, Kermit, Keystone, Leck, McCamey, McElroy, Means, Payton, Pecos Valley (Yates sand), Pecos Valley (Pecos Valley sand), Seminole, Scarborough, Shipley, Slaughter, Snyder, Taylor-Link, Tobarg, Waddell, Ward, South Ward, Wasson (San Andres), Wasson (Wasson 72), Wasson (Clear Fork), Westbrook, Wheat, World, and Yates.

A copy of the publication may be obtained by writing the Bureau of Mines, Department of the Interior, Washington 25, D. C.

Leading Oil Men to Attend Port Neches Dedication

PORT ARTHUR, Tex.—More than 500 leaders in the petroleum industry have been invited to the dedication here February 25 of the world's largest butadiene-from-petroleum plant, operated by Neches Butane Products Co. at nearby Port Neches.

The plant, designed to break one of the bottlenecks in the synthetic-rubber program, represents a joint venture of Atlantic Refining Co., Gulf Oil Corp., Pure Oil Co., The Texas Co., and Magnolia Petroleum Co., subsidiary of Socony-Vacuum Oil Co., Inc.

These companies have oil refineries in this vicinity and will supply the feed stock from which Neches Butane Products Co. will make bu-

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tadiene, an ingredient of synthetic rubber.

Among those invited to the dedication is Col. Bradley Dewey, United States rubber administrator.

Nash Made District 1 Director of Construction

WASHINGTON, D. C. — Appointment of DeLloyd D. Nash, project engineer for Standard Oil Development Co., Linden, N. J., as director of construction for District 1, was announced here last week by the Petroleum Administration for War.

He succeeds Edward Kares who resigned in order to return to his former position, also with the Standard Oil Development Co.

Born in Hudson, N. Y., December 14, 1889, Nash studied engineering at Syracuse University from which he was graduated in 1915 with the degree of electrical engineer. He served in the last war as a lieutenant in field artillery, and joined the Standard Oil Development Co. in 1919. He has served as project engineer with that organization since then.

WLB to Make Resurvey of Wage Rates in Refineries

DALLAS, Tex. — Wage rates and job classifications in oil refineries of Texas, Oklahoma, and Louisiana are undergoing a resurvey by the wage-bracket division of the eighth regional War Labor Board.

Company and union representatives of the oil-refining industry in the Southwest will meet with the board's bracket division here February 18 to discuss the present bracket of stabilized wage rates.

Garland R. Farmer, vice chairman, said refineries in the Oklahoma area are especially interested and will present their wage data.

Period 4 and 5 Fuel-Oil Coupons Valued at 10 Gal.

WASHINGTON, D. C.—Fuel-oil rations in the East, Midwest and Pacific Northwest will remain unchanged at 10 gal. per unit for Period 4 which began February 8, the Office of Price Administration announced last week.

In addition, Period 5 coupons, which also become valid on February 8 in the midwestern states under fuel-oil rationing, have been given a 10-gal. value, OPA said.

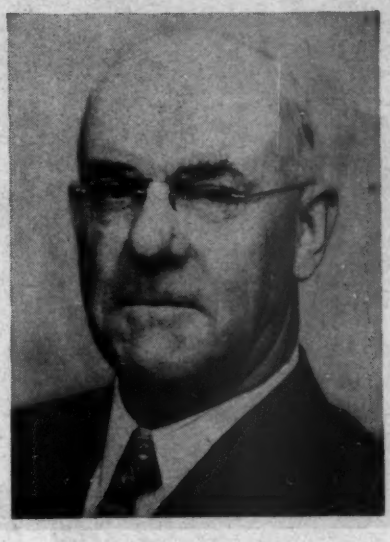
OPA explained that the 10-gal. value announced today is the unit value and not necessarily the coupon value of householders' fuel-oil rations. Some coupons are worth 1 unit (10 gal.), some are worth 5 units (50 gal.), and others, used by larger consumers, are worth 25 units (250 gal.).

Sketches of Plant Operators

AT the age of 14 Charles W. Schaeffer, now manager of the Socony-Vacuum Oil Co. refinery at East Providence, R. I., made his unobtrusive entrance into the oil business as an office boy for the company at 26 Broadway, New York. His duties were in the office of the Devoe Works, which filled 5-gal. cans with kerosene, packed two cans to a case, and shipped them to the Far East, Near East, Australia, Africa, India, and South America. In 1897 he was transferred to the can factory in Long Island City as bookkeeper, and 9 years later he was made superintendent of the factory.

In 1913 Schaeffer was sent to Japan, China, India, and Australia to inspect can plants and to observe methods of handling cases and cans. Upon his return the next year he was made general superintendent of the can factory, box factory, and 5-gal. can filling department. Four years later he was put in charge of the company's Long Island City refinery. In June 1920, he was transferred to the East Providence plant as manager.

The pipe line from East Providence to Worcester and Springfield, Mass., was built in 1931, and since then Schaeffer has had charge of the construction of three other pipe lines: In 1939, a line from Wilbraham, Mass., to Hartford, Conn.; in 1941, a line from Buffalo, N. Y., to Rochester, Syracuse, Ithaca, Elmira, and Binghamton, N. Y.; in 1942, a line across the Delaware River from Paulsboro, N. J., to Gibson's Point, Pa.



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But still available
ON THE HOME FRONT

However, ENSIGN Carburetors for Natural Gas, Butane-Propane and Gasoline are still available for uses not directly connected with the war effort. It may take us a little longer than usual to supply the demand for carburetors, but quick delivery of emergency parts is assured.

Now, as always, ENSIGN is unequaled for efficient and economical carburetion.

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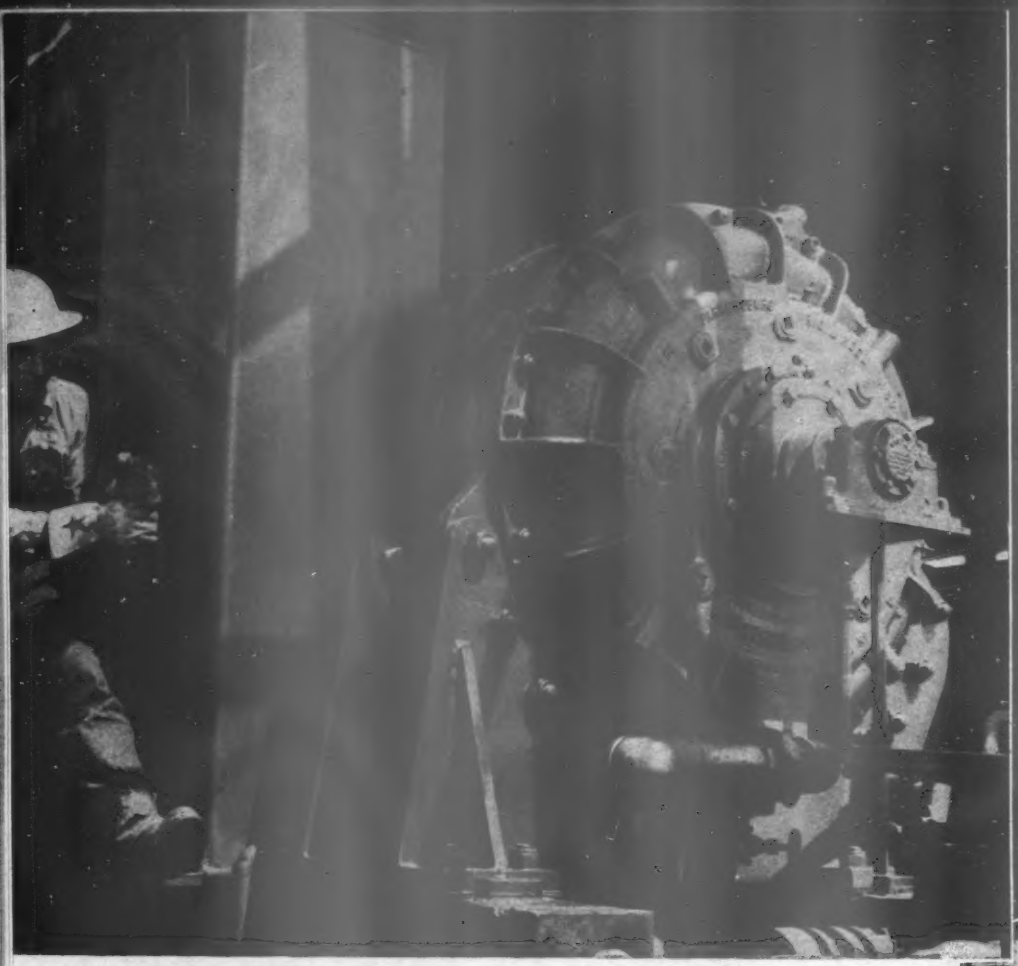
Prepare, NOW, for post-war demands. Our competent engineering staff is at your service.



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Parkersburg Hydromatic Brakes subtract from . . . rather than add to . . . overall drilling costs. Experience gained through 12 years of use prove, without question, that a Hydromatic pays for itself on brake maintenance alone on one 10,000′ hole. One runaway load of drill pipe can cause thousands of dollars in damage, months of delay and loss of life. Hydromatics have saved too many such incidents to enumerate. This revolutionary product not only relieves mechanical brakes of the bulk of their burden, but it has minimized wear and tear on all types of drilling equipment. It has taken the rough edges off of the drilling job too. Yes, comparative cost records will show that far more money has been saved by Parkersburg Hydromatic Brakes than has ever been paid for them.

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Natural Gas

WPB Forbids Natural Gas If Other Fuels Available

WASHINGTON, D. C.—Sixty natural-gas distributing companies in six states are forbidden to make deliveries from February 15 to March 15 to commercial or industrial customers who have adequate standby facilities for burning other fuel than natural or liquefied-petroleum gas, War Production Board has announced.

The companies affected, located in Missouri, Michigan, Illinois, Indiana, Ohio and Kentucky, draw supplies from the Panhandle Eastern Pipe Line Co., which moves natural gas eastward from Texas and Kansas. Curtailment of deliveries to these states will make larger quantities of natural gas available to the Appalachian area, where a shortage is threatening war production, according to WPB.

Controls over deliveries of the fuel have been extended, WPB said, to alleviate this shortage, and the action is expected to provide an additional 20,000,000 cu. ft. of gas a day to war plants.

Supplementing the new order is a special directive addressed to the Panhandle company, requiring it to move all its surplus gas, including that saved by today's extension of OWU controls, into the Appalachian area.

FPC Sets Hearing to Decide On Fairness of Gas Rates

WASHINGTON, D. C. — Federal Power Commission will hold a hearing February 29 in Minneapolis, Minn., to determine the fairness of Montana-Dakota Utilities Co.'s rates for transportation or sale of natural gas. The hearing will determine also, pursuant to an investigation instituted by the commission, (1) whether Montana-Dakota Utilities Co., Minneapolis, is a natural-gas company within the meaning of the Natural Gas Act and (2) whether any of the company's rates or charges are unreasonable or unduly discriminatory.

A complaint filed by Mondakota Development Co. alleges, among other things, that the rates and charges specified in schedules filed with the FPC by Montana-Dakota Utilities Co. for the common carrier transportation of natural gas in interstate commerce were excessive.

The complaint also contends that the right-of-way for Montana-Dakota's pipe line was granted by the secretary of the interior upon the express condition that the line should be operated as a common carrier and that Montana-Dakota as owner should accept and transport natural gas produced from public and private lands in the vicinity of the line without discrimination.

United Gas Co. Franchise At Longview Extended

LONGVIEW, Tex.—The United Gas Co. franchise was extended 16 years by the city commission last week. Existing rates and the same stipulations contained in the franchise granted the Southern Gas Co. a few years ago were incorporated in that given the United Gas Co. The extension makes the permits of the two concerns to do business in Longview expire simultaneously.

Reduced Gas Rates to Effect Annual Saving of $113,000

WASHINGTON, D. C. — Federal Power Commission has issued an order allowing reduced wholesale rates for natural gas sold in Georgia, Alabama and Mississippi by Southern Natural Gas Co., Birmingham, Ala., to take effect April 1. Reductions estimated at $192,851 a year in the cost of gas sold to Southern Natural by United Gas Pipe Line Co. become effective April 1 through an order adopted by the commission. Southern Natural proposes to pass this reduction on to its utility customers by means of supplementary schedules, which reduce the rates for natural gas sold to other utilities for resale to domestic consumers.

Gas Shortage May Curtail War Work in Pittsburgh

PITTSBURGH, Pa.—Warning that a prolonged cold spell may result in curtailment of war production was issued last week by C. C. Morrison, district manager of War Production Board, owing to a critical shortage of natural gas in this area. Morrison urged householders to conserve gas in order to provide adequate supplies for essential industry. Contrary to popular belief, he said, the weather in Pittsburgh since last October 1 has been about 5 per cent colder than in the same period a year ago.

Natural Gasoline

War Diverts Vast Quantities Of Liquefied Petroleum Gas

Immense quantities of liquefied petroleum gas have been diverted to war use, and home installations have undergone a sharp reduction, according to the annual report submitted by G. G. Oberfell, president of Liquefied Petroleum Gas Association. Few new domestic installations are to be expected in 1944, Oberfell says, chief interest of the industry being centered on providing essential war materials while servicing old customers as well as possible.

Almost 2,000,000 families in this country living off city gas mains were serviced in 1943, but less than 75,000 new home installations were made.

Oberfell, who is vice president in charge of the patents, research and chemical patents department of Phillips Petroleum Co., which is a leader in the industry, said rubber and aviation gasoline consumed rapidly increasing quantities of butane and propane.

The report lists war uses as including synthetic rubber for tires, self-sealing airplane gasoline tanks and other equipment; propane for increasing the volatility of high-octane aviation gasoline; mixtures of butane and propane for steel cutting in shipyards and other steel fabricating plants.

The task of servicing homes will increase in 1944, as a result of manpower shortages, the inability of the industry to get new containers and lack of proper transportation facilities.

"Average gallons of liquefied petroleum gas delivered per employe in 1943 increased 123 per cent over delivery per employe in 1941," the report says.

"At the close of 1943 the industry is in the position of further 'tightening its belt' in the face of greater demands by the War Manpower Commission for men for the armed services. A continuation of job studies, proper placement of utilization of the highest skills of available men and women, in conjunction with intelligent and conscientious leadership, should make it possible for the industry not only to maintain its position but to make further advances under what might be termed adverse circumstances."

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Pioneers in Steel Pipe Protection
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LONGVIEW, TEX. • CORPUS CHRISTI, TEX.

WEP Crude Oil Deliveries Break Previous Records

War Emergency Pipelines, Inc., broke all records February 13 by delivering a total of approximately 443,000 bbl. of crude oil from the 24-in. line consisting of 411,128 bbl. to Philadelphia and New York terminals and 31,959 bbl. to the Ohio Oil Co. at Enfield, Ill. On the same day 316,160 bbl. were pumped northward from Longview, Tex. During the first half of February shipments from Longview averaged 313,735 bbl. daily.

The head of the products stream moving eastward through the WEP 20-in. line had reached a point near Station 17 between Washington Court House and Circleville, Ohio. At the present rate of advance, 5,000 bbl. per hour, products are due to reach Linden, N. J., in the New York City area on February 24.

The 11-mile 20-in. loop being laid in the vicinity of Chambersburg, Pa., is at the base of Tuscarora Mountain where it will serve as insurance in a section where surges under high pressures are anticipated. Eventually the 11-mile section of the line which it parallels will be removed.

The WEP 20-in. line will function at half capacity during March and will be operated at full capacity in the second quarter of the year.

Adequate supplies of products are scheduled for shipment through the WEP 20-in. line to insure that facilities will be adequately utilized. Shipments for April will consist of gasoline, heating oil and Navy diesel oil. No consideration is now being given to shipping crude oil through the WEP 20-in. line.

Contract Let for Venezuela Work

A contract has been let for the construction of an 80-mile road in Venezuela to Morrison-Knudsen Construction Co., Boise, Idaho, by interests which are planning the construction of a pipe line which will terminate at the coast at Puerto la Cruz. Associated in the contract are Williams Brothers Corp. and Raymond Concrete Pile Co. Plans of Creole Petroleum Corp. and Mene Grande Oil Co. to build a 100-mile 16-in. crude-oil line to terminate at Puerto la Cruz were discussed in the Journal February 10, page 84.

Texas Pipe Line Removes Salem-Lawrenceville Line

The 72-mile 6-in. natural-gas line from the Salem field to The Texas Co. refinery at Lawrenceville, Ill., of The Texas Co. is being removed by Texas Pipe Line Co. because of insufficient gas supply and the need for the pipe at other points of The Texas Co. operations in Louisiana and elsewhere. Perry Construction Co. had work under way at the beginning of this week. The pipe is being dug up by two gangs.

Sinclair Completes E. Chicago-Toledo Line

The 250-mile 8-in. East Chicago, Ind.-Toledo, Ohio, products pipe line

C. S. FOREMAN COMPANY

General Contractors

PIPE LINES

20 West Ninth Street
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FOR TRADE:

Buckeye 12, ditching machine, good condition, to trade for Buckeye 36 or larger.

United Contracting Co.

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of Sinclair Refining Co., has recently been completed and operations for filling the line are under way. According to reports some backfilling remained to be done last week. All of the seven pump stations are finished and ready to operate.

Completion of Yale Project Scheduled for June

The 82-mile crude-oil pipe line to be constructed of 6-in. and 8-in. pipe for Yale Oil Pipe Line Co. from Elk Basin and Frannie oil fields of Wyoming to refineries at Laurel and Billings, Mont., is scheduled for completion in June. The 6-in. pipe is being delivered to the project. Pumps and engines have been ordered for delivery in the latter part of April.

Construction Progresses for Tennessee 24-in. Gas Line

Tennessee Gas & Transmission Co. is pushing construction of line and stations along the route of the 1,200-mile 24-in. natural-gas line from Corpus Christi, Tex., to the Kentucky-West Virginia area. In addition to the spreads of Williams Brothers Corp., working east from the Ouachita and Mississippi rivers, west from the Tennessee-Kentucky boundary and a spread of Bechtel-Dempsey-Price working east from Batesville, Miss., two spreads will be started soon by Bechtel-Dempsey-Price in Kentucky. Clearing of right-of-way will start within 2 weeks and laying of pipe will begin in 30 days.

With the exception of construction of gathering lines in the Corpus Christi area by Henry Lemons & Co. there has been no pipe laying in Texas, where wet ground is reported to have caused delays.

In the middle of March three spreads are scheduled to go into the field in Texas for Williams Brothers Corp., N. A. Saigh Construction Co., and Brown & Root, Inc.

National Tube Co. and A. O. Smith Corp. have delivered more than 200 miles of pipe to all spread locations along the route, with the exception of those in Kentucky where deliveries are due to arrive after February 20.

To extend the system beyond the eastern terminal of the 24-in. line the Tennessee company has bought 85 miles of 20-in. pipe. Contracts for laying this pipe will be let the first of March. Work on this extension will start in April.

Construction is in progress at the following stations: No. 6, Monroe, La.; No. 8, Batesville, Miss.; No. 10, Lobelville, Tex. Work is starting this week on No. 12, Campbellsville, Ky. Building of the dehydration plant at the initial station at the western end of the line is well advanced.

Charter Sought for Wyoming-Puget Sound Project

With the filing of articles of incorporation in Montana for North Pacific Pipeline Co., Billings, Mont., announcement was made of the company's plans to build a pipe line from Wyoming through Montana to Puget Sound in the state of Washington. Capital stock of the company is to be $1,000,000. Incorporators are Lt. Gov. Ernest T. Eaton of Montana, E. A. Beeler, L. R. Hines, Ernest E. Murray and J. J. McKay, all of Billings, Mont.

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BRANCH STORES AT ALL IMPORTANT PLACES IN THE OIL COUNTRY

Exploration and Drilling

Week's Highlights

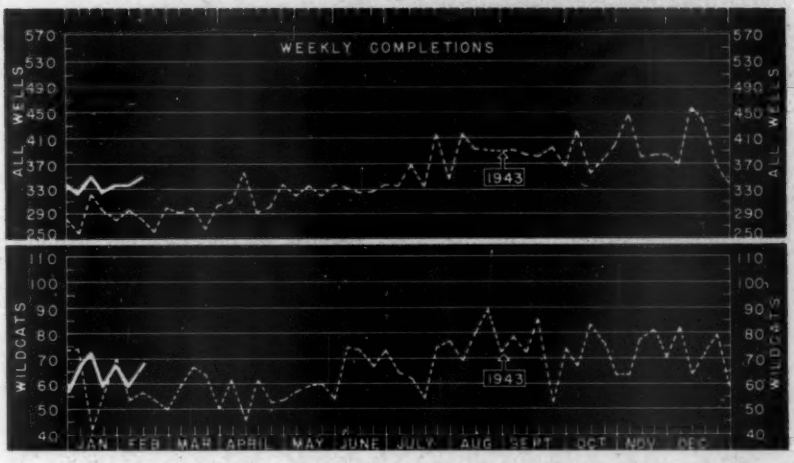
TRENDS in West Texas exploitation are beginning to form a definite pattern although the year, expected to be one of the most active in the history of the Permian basin's petroleum history, is less than 7 weeks old.

Probably the most positive conclusion that can be reached at this stage of 1944 operations is that extensive and thorough exploration of the Ellenburger is on the program for practically every Permian structure in the basin. Many of the prospective deep structures will be tested this year, probably not less than 30, with development drilling substantially intensified in the areas proven productive in 1943 and earlier years.

Another test of Ellenburger producing possibilities is definitely scheduled for the Howard-Glasscock field, one of the older Permian lime fields which is considered to have inviting prospects in the deeper rocks. There is a strong possibility that the Goldsmith field in Ector County will receive its first Ellenburger test during the year. Lease owners in the southern part of the Hendrick field, Winkler County, are attempting to arrange acreage and other details for exploration of the Ellenburger in that field.

Meanwhile, companies with Ellenburger production proven at widely scattered spots in northern and eastern Winkler County are intensifying their drilling programs, both for the purpose of increasing production for the expanded transportation capacity scheduled for completion next month and in April and for determining the productive extent of structures which currently consist of one or two wells.

Greater availability of drilling equipment and the insatiable demand for crude oil are linked with the transportation-expansion program in directing the spotlight of interest on West Texas to an extent the area has not enjoyed since 1930. It would be difficult to select either of the three influences as the uppermost in extending the search for deep production in West Texas, although it is probable that demand for crude oil, apparently unobtainable within time limitations in numerous other prospective areas, is the dominant factor which in turn has forced an enlargement of pipe-line capacity and which has also influenced the channeling of materials.



Solid line charts current weekly completions

COMPLETIONS IN ALL FIELDS . . .

(Week ended February 12, 1944)

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1944	1943
N. Y., Penna., W. Va.	39	16	2	57	135,781	348	346
Ohio	3	8	9	20	53,580	97	84
Indiana	5	0	1	6	12,747	37	26
Kentucky	3	2	1	6	11,001	72	26
Illinois	18	0	6	24	58,559	182	211
Michigan	4	1	9	14	40,320	57	44
Kansas	16	0	14	30	105,100	199	147
Nebraska	0	0	0	0	0	6	3
Missouri-Iowa	0	0	0	0	0	3	2
Oklahoma	23	2	11	36	131,649	159	132
Texas:							
North Central Texas	20	0	19	39	117,395	132	141
West Texas	13	0	7	20	86,180	155	97
Texas Panhandle	3	0	0	3	9,251	15	28
Eastern Texas	1	0	3	4	25,838	36	29
Texas Gulf Coast	6	3	5	14	94,743	48	44
Southwest Texas	4	2	10	16	82,809	108	99
Total Texas	47	5	44	96	416,216	495	438
North Louisiana	2	3	3	8	35,523	28	33
Louisiana Gulf Coast	2	1	2	5	48,260	37	41
Total Louisiana	4	4	5	13	83,783	65	74
Arkansas	0	0	2	2	8,338	19	17
Mississippi and Southeast	2	0	2	4	28,920	21	3
Montana	3	1	0	4	10,277	27	18
Wyoming	4	0	0	4	16,042	14	18
Colorado, Utah	1	0	0	1	6,510	3	1
New Mexico	2	1	4	7	23,169	46	23
California	22	1	5	28	90,714	191	111
Total United States	196	41	115	352	1,232,706	2,042	1,724
Total previous week	224	29	91	344			
Week ending Feb. 13, 1943	163	37	83	283			

CALIFORNIA

Amerada's Test Opens New Field or Extends Old One

LOS ANGELES, Calif. — Amerada Petroleum Corp. has chalked up a discovery in the Lanare district of Fresno County, although there is a question whether the well, 65-15 California Lands, in 15-17s-18e, has opened up a new productive area or extended the Helm field to the southeast. This wildcat is too far from production to permit close correlation and its structural location has not been definitely determined. The discovery was brought in flowing 104 bbl. of clean 29.3-gravity oil and 35,000 cu. ft. of gas daily through a 14/64-in. bean from probable Eocene rocks at 8,060 ft.

In the Polvadero district of Fresno County, between the Coalinga Nose and Kettleman North Dome fields, Standard Oil Co. of California 1-A Bourdieu is still held up by mechanical difficulty, but should be ready for another production test soon. This wildcat has cored oil sand in two intervals, but one sand interval was wet and it has been cemented off.

Barnsdall Oil Co. and Bandini Petroleum Co. cored a Pliocene oil sand and conglomerate at 5,600-5,795 ft., followed by gray sand, then some more oil sand and oil-stained sand in 1 Roosa, an outpost at the extreme northwestern end of the Aliso Canyon structure. In view of the extent of oil sand cored, it is believed quite possible that Barnsdall and Bandini's outpost, on the Roosa property, will result in commercial production, and if such proves the case this well will extend the limits of the Aliso Canyon field or open up a new productive area. Standard recently cemented 7-in. casing in 1-2 Frew, another outpost in the west end of the Aliso Canyon field and is at present drilling and coring ahead. This outpost is located about 1,500 ft. from Barnsdall and Bandini's outpost.

This area presents one of the roughest districts in the state and lack of good roads is marked.

General Exploration Co. will probably make a production test of its outpost in the east end of the Newhall Potrero field within the next week or 10 days, as an effective water shutoff was made a few days ago and drilling operations were resumed.

Because of the apparent inability of prospectors to discover new fields in Los Angeles Basin, operators have started a series of deep tests in existing fields. Union Oil Co. has started deepening operations in the Montebello field extension and will start a new hole instead of attempting to deepen the original hole in 3 Howard & Smith. In the northwest end of the Inglewood field, Federal Oil Co. is considering the advisability of drilling a conclusive deep test which would be carried below the base of the Sentous zone of Miocene age, provided other producers contributed a fair share of dry-hole money.

CALIFORNIA WILDCAT COMPLETIONS

Jacalitos district, Fresno County: Standard of California, 17-21s-15e, flow 5,000,000 cu. ft. gas, no oil, shut-in pressure 1,250 lb., TD 5,542 ft., PB 3,960 ft., perf. 3,700-20 ft., 3,730-60 ft., top Temblor 3,523 ft., lower variegated 3,681 ft., Kreyenhagen 3,942 ft., Eocene 4,807 ft., Cretaceous 5,082 ft., completed in Miocene interval. Discovery.

Round Mountain district, Kern County: Trico Oil & Gas Co. 1 Caldwell, 5-29s-29e, dry at 1,281 ft.

Santa Maria district, Santa Barbara County: Continental Oil Co. 1 Davis, 28-10n-34w, dry at 2,779 ft.

Strand district, Kern County: Continental 1-H Kern County Land, 18-39s-26e, dry at 8,495 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Feb. 12 crude oil	Distillate, allied products	Feb. PAW quota all oils	Feb. 5 crude oil
Arkansas	78,880	5,100	81,780	78,715
California	791,500	46,700	883,200	790,250
Colorado	6,390	.....	7,000	7,400
Eastern fields	71,575	10,000	82,200	73,600
Illinois	218,450	12,600	227,600	217,225
Indiana	13,320	.....	14,000	14,000
Kansas	281,750	6,100	291,100	266,900
Kentucky	21,750	2,900	25,100	22,500
Louisiana	360,300	27,000	375,700	359,630
North Louisiana	77,200	.....	.....	76,680
Louisiana Gulf	283,100	.....	.....	282,950
Michigan	53,400	200	50,200	53,100
Mississippi	43,950	.....	46,000	45,790
Montana	23,430	300	24,000	25,845
Nebraska	1,100	.....	1,200	1,150
New Mexico	113,050	5,900	116,600	113,000
Oklahoma	327,200	28,000	356,000	328,500
Texas	1,908,325	122,000	2,018,000	1,899,295
East Texas	390,625	.....	.....	366,200
West Texas	362,100	.....	.....	364,625
North Central Texas	139,950	.....	.....	140,200
East Central Texas	110,250	.....	.....	116,450
Texas Panhandle	102,000	.....	.....	97,920
Texas Gulf Coast	704,600	.....	.....	714,200
Southwest Texas	98,800	.....	.....	99,700
Wyoming	98,500	5,800	98,800	98,890
Total United States	4,412,960	262,600	4,701,480	4,395,790

Total production, January 1-February 12, 1944	188,706,675 bbl.
Same period last year	165,689,165 bbl.

EASTERN TEXAS

Six New Wildcat Locations Week's Center of Interest

DALLAS, Tex.—Only four completions were reported for the week, three dry holes, and one an oil well on the southeast flank of Quitman. Principal interest was in the staking of six new wildcats in five counties. In Hunt County, Humble Oil & Refining Co. will make another try for Smackover production at its 1 E. M. Anderson, 5 miles northwest of Greenville, and about the same distance north of its 1 Lessa Norman, abandoned this week at 7,157 ft. Humble also staked a new wildcat in Smith County, this one to test the Pettit. It is 1 Shamburger, Thomas Hawkins Survey, 4,750 ft. southeast of Arkansas Fuel Oil Co. 1 Priscilla Marsh, now drilling below 7,345 ft. in hard sand and shale. It is also about 6,500 ft. southeast of Skelly Oil 1 Chisum, now testing several zones in preparation of dual completion.

In western Cherokee County, 2 miles south of Ironton, American Liberty Oil Co. 1 Cobb-Holman will be a 5,200-ft. test. In Lamar County, Cosden Petroleum Co. 1 W. T. Adams is to go 5,000 ft. It is 1 mile south of Faught and 7 miles northeast of Paris. Smith County's second wildcat is Bobby Manziel 1 J. L. Morrison, 5 miles northeast of Starville.

Franklin County.—Humble 1 Hogue, near the Titus County line, was drilling below 10,090 ft. in shale and anhydrite.

Sabine County.—Delta Drilling Co. 1 T. E. Ridge estate was drilling below 7,070 ft.

Wood County.—Shell Oil Co., Inc., 1 Whatley, southeast of Manziel pool, plugged back to 8,902 ft. from total depth of 9,005 ft., and on drill-stem test at 8,790-8,902 ft. showed only 190 ft. of drilling mud in 30 minutes.

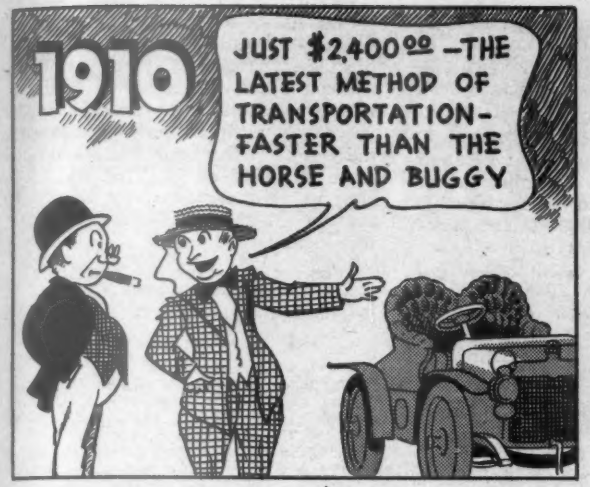
Navarro County.—Brown & Wheeler et al 1 Guy Gibson, Fontenoy Survey, was drilling below 7,200 ft. after clearing up a fishing job.

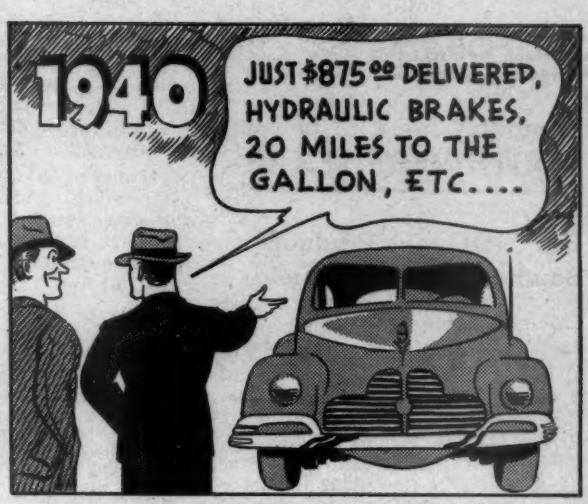
EAST TEXAS WILDCAT COMPLETIONS

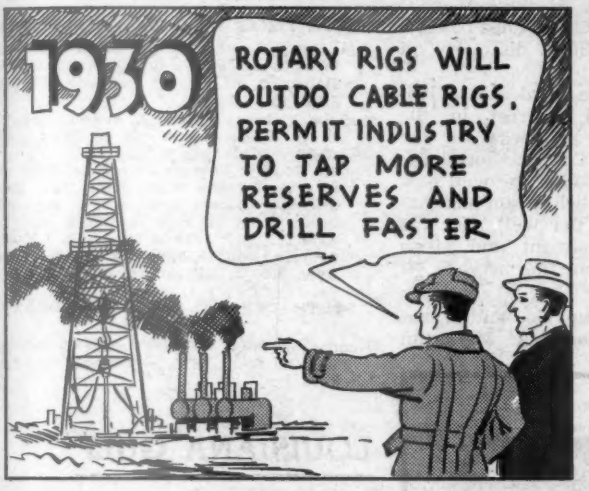
Hopkins County: R. B. Campbell and A. G. Hill 1 J. W. Warren, James C. Sanders Sur., Pecan Gap 1,750 ft., Austin 3,350 ft., Woodbine 4,033 ft., Paluxy 5,764 ft., dry at 5,991 ft.

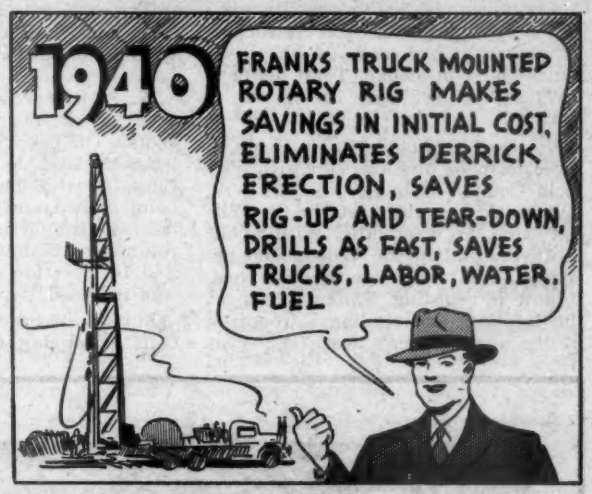
Hunt County: Humble 1 Lessa Norman, Hiram Thompson Sur., Paluxy 3,392 ft., Cotton Valley 6,000 ft., dry at 7,157 ft.

Marion County: Bradford & Scivally 1 Vic-





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SOUTHWEST TEXAS

Humble Opens Production Southeast of Alfred Field

CORPUS CHRISTI, Tex. — Humble Oil & Refining Co. has opened oil production about 1½ miles south-southeast of Alfred field in Jim Wells County. The discovery is 1 E. M. Brownlee in J. Wright Survey. (Was formerly 1-C San Antonio Joint Stock Land Bank). It flowed 32 bbl. of oil a day through ⅛-in. choke with tubing pressure of 1,200 lb. and was shut in. It probably will be reworked. Previously it had made 54 bbl. in 24 hours on ⅛-in. choke. Total depth is 5,373 ft., with 5½-in. casing set to 4,985 ft.

Northern Ordnance Co. 1 Heath, a mile north of Mission Valley in Victoria County, is being watched with interest as operator tests in the Wilcox zone. It is credited with about 28 ft. of sand in the Wilcox and recovered salt water on the first test. It now is retesting. Tanks are up at the location, and trading is reported in the area. Wilcox was topped at about 8,000 ft. Total depth is 10,014 ft., with 5½-in. set at 9,950 ft. The well had sand with gas show at 8,404-30 ft., show of oil and gas at 8,430-35 ft., salt water at 8,435-60 ft. and gas sand at 9,855-95 ft.

Standard Oil Co. of Texas 1 Canales has failed to show anything of importance testing in perforations at 5,101-11 ft., swabbing and flowing a small quantity of oil by heads. It is still testing. Total depth is 5,806 ft., with 5½-in. set at 5,236 ft. Top of the Pettus sand, with oil odor, was penetrated at 5,096 ft. This test is in Jose Marcello Hinojosa Grant, 3½ miles southeast of Crestonio in Jim Hogg County.

Texas Conservative Oil Co. 1 Elliott, ½ mile northwest of the North Odem discovery well, developed 325 lb. working pressure, no fluid, on drill-stem test, in 5½ minutes, at 3,366-79 ft. It is drilling ahead below 4,700 ft. to the 5,430-ft. discovery oil pay.

W. A. Richardson et al sold a 175-acre checkerboard interest in the Blanco Oil Co. 350-acre lease on von Blucher land to Contex Petroleum Corp. The deal included the well now being drilled, and Richardson has contract to complete the well. He was refunded his investment and given a 3/16 override on the acreage, it was reported.

Phillips Petroleum Co. and Texas Gulf Producing Co. 1 A. M. Bruni estate, gas-condensate discovery well 7½ miles southeasterly from Pescadito in southern Webb County, showed improvement when acidized. After acidization it made 1,450,000 ft. of gas with 10 bbl. of condensate daily on ¾-in. choke. Perforations were at 4,962-72 ft. The well was shut in. It had made only 425,000 ft. through ¼-in. and ⅜-in. chokes before acidization.

LOWER GULF COAST WILDCAT COMPLETIONS

Bee County: Bridwell Oil Co. 1 Mrs. Emma Huddleston, 4 mi. E SE of Beeville, dry at 4,306 ft.

The Texas Co. 1 Vernice H. Cook, ¾ mi. northwest of Mineral, dry at 7,615 ft.

Goliad County: Continental 1 A. Coutret, Jr., 11 mi. W NW of Goliad, dry at 9,130 ft.

Refugio County: P. R. Rutherford and Royal Oil & Gas Corp. 2 Oppenheimer estate, North LaRosa area, Sec. 36, Johnson & Pugh subd., dry at 6,338 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Jim Hogg County: M. L. Massingill and Wm. H. Spice 1 J. H. Allen and C. W. Hellen, 2 mi. NE of Randado, dry at 3,510 ft.

LaSalle County: Chas. E. Fraser, Inc. 1 D. C. Reese, 6 mi. SW of Washburn field, dry at 5,719 ft.

Zapata County: Venture Petroleum Corp. et al 1 San Juana P. de Vela, new pay discovery Lopeno field, Blk. 1, Jamison subd., Porc. 21, new pay 2,515 ft., TD 2,770 ft., perf. 2,515-50 ft., comp. 1-25-44, potential test 15,500,000 cu. ft. gas open flow, 910 lb. RP, no water.

SOUTH CENTRAL TEXAS WILDCAT COMPLETION

Kendall County: C. G. Hamill 1 C. G. Hamill, 6 mi. SW of Boerne, dry at 2,405 ft.

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LOUISIANA GULF

Texas Trying to Sidetrack After Attempted Blowout

NEW ORLEANS, La. — The Texas Co. was trying to sidetrack the 1 Charles H. Swift, wildcat in 14-5s-7e, 2½ miles northeast of Krotz Springs, after an attempted blowout at total depth of 10,617 ft. The blow was controlled, but the well could not be quieted.

Gulf Refining Co. completed 9 State-West Bay, Lease 192, in the West Bay field, Plaquemines Parish, to open another deep sand for the area. At total depth of 10,474 ft. with 5½-in. set on bottom, pipe was perforated at 10,442-52 ft. and the well flowed 581 bbl. daily on ⅞-in. choke. Tubing pressure was 4,500 lb. Most wells are producing from shallower depth.

Gulf Refining Co. abandoned one deep Wilcox test on the south flank at Pine Prairie dome of Evangeline Parish and staked location for another Wilcox test in the same general area. The dry hole was 1 Chapman-Miller-Lehaye unit, in 2-4s-1w. The new location is 8-A Schlicher-Thomas, in

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3-4s-1w. In the same area the company's 7-A Schlicher-Thomas, 3-4s-1w, is drilling at 6,700 ft. in deviated hole. Gulf's 1-B Schlicher-Thomas, 35-3s-1w, Wilcox test on the west flank, was drilling below 10,200 ft. in hard shale, and 2 Schlicher-Thomas, 37-3s-1w, Wilcox test on the east flank at Pine Prairie, was drilling at 10,750 ft. in hard shale.

Phillips Petroleum Co. and Tide Water 1 F. A. Godchaux, Sr., in 88-14s-3e, wildcat in Intra-Coastal City area, Vermilion Parish, ran electric log to 12,000 ft. and drilled below 12,100 ft.

LOUISIANA GULF COAST WILDCAT COMPLETIONS

Terrebonne Parish: Gulf 1 South Shore Oil & Development Co., 28-17s-18e, Presque Isle area, dry at 12,021 ft.

Evangeline Parish: Gulf 1 Chapman-Miller-Lehaye unit, S flank Wilcox test at Pine Prairie, 2-4s-1w, dry at 11,007 ft.

CANADIAN FIELDS

Madison Lime Will Be Tested East of Turner Valley

CHATHAM, Ont.—An important development which may open a large area east of Turner Valley is the striking of the Madison limestone in New Ranchmen's-Snider 1, LSD 16, 34-19-29w4, on the Aldersyde structure near High River. Location is about 12 miles east of West Central Turner Valley and 25 miles south of Calgary. Test got the Madison at 7,866 ft. and drilled 10 ft. in. Lime elevation is 4,200 ft. below sea level, or 960 ft. higher than in the Arca deep test 8 miles to the southwest, which encountered water in the lime.

The drilling depth to the lime is considerably less than in some recent Turner Valley crude producers. Oil shows were met in the basal Blairmore at 7,660 ft. with further shows at 7,720 ft. and a 40-ft. porous zone from 7,760 ft. Casing is being cemented around 7,720 ft. preparatory to drill stem tests of these sands and of the first 10 ft. of the limestone. The well will be deepened later for a thorough test of the Madison.

Open Alberta reserves.—The Alberta government has issued regulations covering the projected leasing of the provincial petroleum reserves which are being thrown open to development. The reserves include 14 areas extending from the northern limits of the province to close to the international boundary.

A large part of the acreage thrown open is in the northern and western parts of the province.

Electricity for pumping. — For the first time in the history of Alberta, electricity will be used for pumping wells in the Vermilion field. O. R. Hollingsworth and associates are constructing a 1½-mile power line from the Canadian Utilities line at Borrodaile to the Hollingsworth lease where transformers are installed. The power will be used not merely for pumping, but for drilling new wells, as well as for camp purposes.

MICHIGAN

Four Producers and Three Failures in Proven Areas

SAGINAW, Mich. — While completing a half-dozen wildcat tests as dry holes, Michigan oil operators last week added four crude-producing wells to the list. Three other tests in proven areas were dry and first natural-gas producer of the year was found in Norwich Township, Newaygo County. One of the wildcats, Sun Oil Co. 1 Nash, in Sherman Township, Gladwin County, was listed as "temporarily abandoned" at 5,060 ft. The producers were a 116-bbl. well in Monitor Township, Bay County; one producing 359 bbl. in Fork-Mecosta, a 200-bbl. well; and another, good for 100 bbl., in Van Buren County.

Bringing the 1944 total to 46, the state Conservation Department issued nine more drilling permits, three for Arenac County, one each for Montcalm, Ottawa, Calhoun, Osceola, Kalamazoo and Allegan counties.

The department's geology division summary of 1943 operations reports Michigan crude production last year as 20,767,724 bbl., compared with 21,753,771 bbl. in 1942. There was a net increase of 62 producing wells. The decrease in production was attributed to failure to find new fields of sufficient size to offset the natural decline of old wells, and to greater proration restrictions. The division said 635 tests were drilled, resulting in 233 oil wells and 47 gas wells. The 355 dry holes compared with 311 in 1942. The wells had initial potential of 71.55 bbl. of oil daily and 247,000,000 cu. ft. of gas. In 1942, 247 new wells had initial potential of 257,860 bbl. of oil and 316,541,000 cu. ft. of gas.

MICHIGAN WILDCAT COMPLETIONS

Allegan County, Overisel Township: W. Spencer Cook 1 Benjamin Albers, NW NE NE 30-4n-14w, dry in Traverse at 1,740 ft.

Barry County, Carlton Township: Sun Oil Co. 1 James Bowler, NE NW NW 27-4n-8w, dry in Monroe at 2,498 ft.

Gladwin County, Sherman Township: Sun Oil Co. 1 Ervin D. Nash, C NE SW SW 31-20n-2w, temporarily abandoned at 5,060 ft.

Gratiot County, Hamilton Township: Arthur E. Williams 1 Mae Ryan, SW SW SE, 32-10n-1w, dry in Monroe at 3,003 ft.

Mason County, Logan Township: James F. Campbell 1 G. H. Young et al, NE SW SW 4-17n-15w, dry in Traverse at 1,948 ft.

Ottawa County, Chester Township: Ottawa Oil & Gas Co. 1 Jacob Bush, SW SW SW 4-9n-13w, dry at 3,036 ft.

TEXAS GULF COAST

Gulf Gets Another Excellent Dual-Sand Oil Producer

HOUSTON, Tex.—Gulf Oil Corp. has completed another excellent dual-sand oil well on the Chambers County side of the Stowell field, northwest area, at the 1 Woods-Ruidenga unit, Lot 9, Koch subdivision, Valmore Survey, at total depth of 7,820 ft., with 5½-in. set on bottom. "A" sand, perforated at 7,807-18 ft., flowed 366 bbl. through 7/32-in. choke, with a trace of water. Tubing pressure was 1,000 lb., gas-oil ratio 556 and gravity 36.7. "B" sand, perforated at 7,640-60 ft., flowed 449 bbl. through ¼-in. choke, with casing pressure of 750 lb., gas-oil ratio 560 and a trace of water. This is a total of 835 bbl. daily from the two sands.

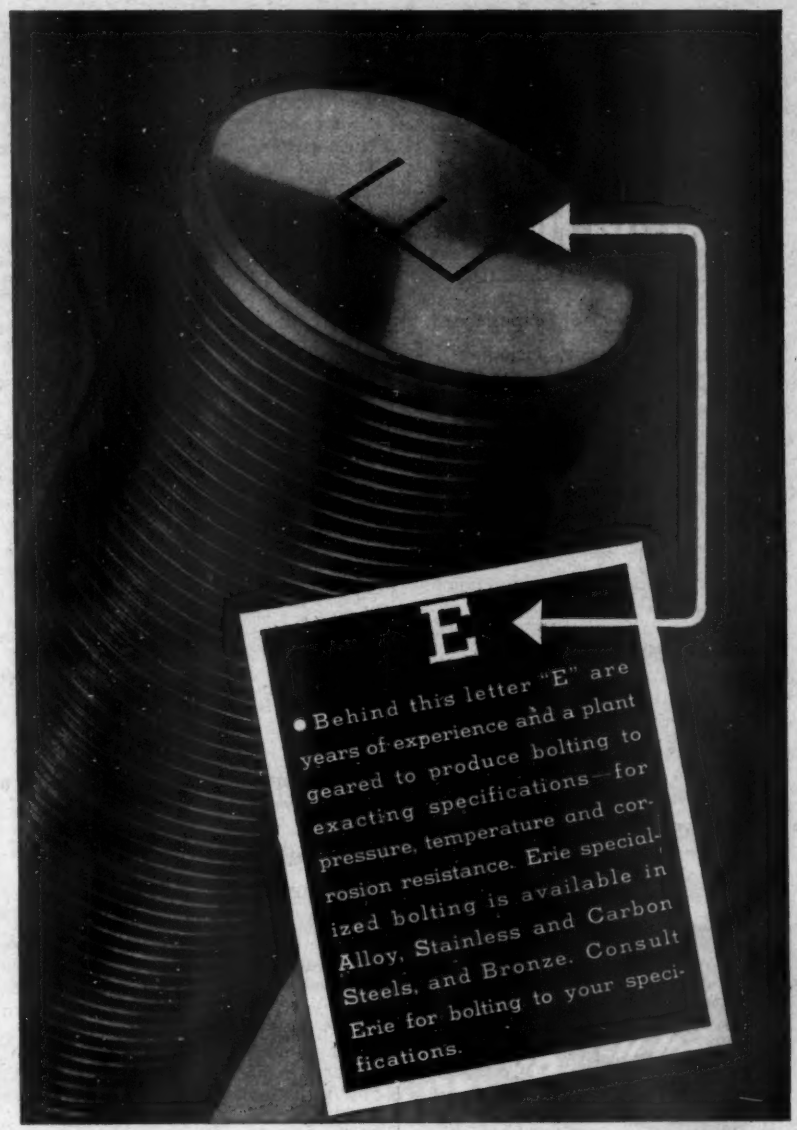
The Shepherd area of San Jacinto County is again in the spotlight. Stanolind Oil & Gas Co. goes ahead in 1 The Roberts Co., Inc., 3 miles southwest of Shepherd townsite, below 6,500 ft. in sandy shale and lime. Navarro Oil Co. has staked location for another test in the area, 2 The Roberts Co., about half a mile southeast of the company's 1 The Roberts Co., a 9,257-ft. dry hole drilled a few months ago.

Jack Frazier and Cities Service Oil Co. are running a new test at 1 C. K. Gay et al, discovery well 3 miles northwest of Columbus in Colorado County. The well had flowed gas-condensate with a little salt water in perforations at 7,810-12 ft., then recovered salt water on drill-stem test at 7,676-80 ft. Casing was perforated at 7,664-68 ft. and a 36-hour drill-stem test was made. The well flowed at the rate of 140.4 bbl. fluid a day on the last 5½ hours of this test through ¼-in. choke, of which 111.8 bbl. was 46.7-gravity oil and 28.6 bbl. was salt water. These perforations were also squeezed off, operators believing that water may have been the result of a bad cement job. Total depth is 8,037 ft., with 5½-in. casing set on bottom.

Standard Oil Co. of Texas located another test in the Smith Point area of Galveston Bay, Chambers County, the 2-109 State-Galveston Bay, 1,320 ft. northeast from the 1-109 State, current test which was standing with 7-in. casing set at a total depth of 8,626 ft.

On Blue Ridge southwest flank, Fort Bend County, Phillips Petroleum Co. 5 Em. R. Robinson-Bashara, Hicks Shropshire Survey, flowed potential of 186.92 bbl. through ¼-in. choke from perforations at 3,868-73 ft. Total depth in sidetracked hole is 4,251 ft.

Salt Dome Oil Corp. gaged the 2 Anna G. Menefee et al, second gas well in the new Menefee gas field,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about 5½ miles northwest of Louise, in Wharton County, at total depth of 4,618 ft. with 5½-in. set on bottom and perforations at 4,536-51 ft. The well flowed 5,620,000 ft. of gas daily through ⅜-in. choke with tubing pressure of 1,650 lb.

TEXAS UPPER GULF COAST WILDCAT COMPLETIONS

Austin County: Pan American Production Co. 1 Austin College, southwest flank Raccoon Bend dome, Wm. C. Harvey Sur., perf. top Wilcox sand 7,298-7,308 ft., comp. 2-2-44, est. 150,000 ft. gas, with slugs of oil, oily mud and mud (est. 3 to 4 bbl.) on 40/64-in. choke, TD 7,312 ft. Discovery.

Chambers County: Wynn Crosby Drilling Co. et al 1 Mary Etta Mayes, Robt. Oliver Sur. A-360, 1 mi. SW of Jackson Pasture discovery well., perf. 8,082-88 ft., cleaned and shut in 12-22-43, SIP 2,550 lb., considerable condensate, no water, TD 8,434 ft.

Fayette County: R. T. Wilson 1 Alfred Levien, 1¾ mi. N of Round Top, abandoned at 5,526 ft.

Fort Bend County: Phillips Petroleum Co. 5 Robinson-Bashara, Lot 14, Duff & Robinson subd., SW flank Blue Ridge, top sand 3,868 ft., perf. 3,868-73 ft., comp. 1-31-44, 186.92 bbl. through ¼-in. choke, gas-oil ratio 322, TP 430 lb., CP 1,410 lb., no water, TD 4,251 ft.

Jackson County: W. Stewart Boyle et al 1 J. M. Hutcheson, 3½ mi. SW of West Ganado field, dry at 6,010 ft.

N. CENTRAL TEXAS

Burns-Midway Pool Outpost Testing the Mississippian

WICHITA FALLS, Tex. — Lacy & Flannery 1 M. M. Lyles, 1 mile southwest outpost to the Burns-Midway Mississippi lime pool, southern Clay County, showed fromise of opening a new pool from the Bend conglomerate at 5,569-78 and 5,860-70 ft., and was testing the Mississippian at 6,183-95 ft. The Mississippian had a show of oil at 6,163-75 ft., total depth being 6,234 ft., but it was thought unlikely that it would produce from this horizon. However, it was being treated with 1,000 gal. of acid before plugging back to test the conglomerate.

A disappointment for the Stephens pool was Continental Oil Co. 1-A T. J. Stephens, which showed salt water on drill-stem test at 6,194-6,240 ft., and was abandoned. Premier Oil & Refining Co. and Joe A. Humphrey 1 Fred Wines, 2 miles east of Joy, failed to find production in the Mississippi lime, and was abandoned at 6,329 ft.

Cooke County.—Four locations have been staked around the new discovery in the Strawn sand in eastern Cooke County, all by Northern Ordnance, Inc., discoverer of the pool. Northern's 1 Foy Davis, Coy Survey, flowed 8 bbl. an hour in a 2½-hour test, and is still testing. A short extension for the northeast side of the Winger sand area of the Walnut Bend pool was Carter-Gragg Oil Co. 3 G. L. Ramsey, in the C. Furnash Survey. It was completed flowing 81 bbl. on a 3-hour completion test.

Young County.—A. G. Bedner 1 T. D. Finley, J. Poitevent Survey, east of Graham, further indicated a new pool when it flowed 20 bbl. of oil and 20 bbl. of water through perforations at 3,940-80 ft., after treatment with 3,000 gal. of acid. Casing was reperforated at 4,035-50 ft. Tubing and packer were run to 4,020 ft., and another treatment with 2,000 gal. of acid followed. A gasser was indicated at Shell Oil Co., Inc., 1 J. S. Bridwell, Sewell pool, when it perforated casing opposite the Caddo lime at 3,918-40 ft. and showed gas immediately, with no oil. Tubing was being run, and the section will be acidizied.

Montague County. — Further extension to the Hildreth pool to the west was effected by C. H. Murdick 1 Walthall, ET Ry. Survey, which was flowing by heads after perforating casing opposite the conglomerate section. In the Dod pool, Phillips Petroleum Co. 3 Dod went to water in the lower conglomerate pay, and was plugged back to 5,178 ft., perforated at 5,136-46 ft., and recompleted, flowing 90.92 bbl. in 3 hours, with no water. Effort to extend the Ketchum pool ½ mile northeast failed at E. L. Wilson et al 1 S. W. Heard, Hill County School Land Survey, which was abandoned at 3,400 ft. It had a slight show of oil at 3,345-52 ft.

NORTH TEXAS WILDCAT COMPLETIONS

Archer County: M. W. Blair 1 Mrs. Alwine Wilhelm, TE&L Sur., dry at 1,426 ft.

Cooke County: J. D. Cavaness 1 John Kubicek, John Greeg Sur., dry at 1,768 ft.

Jack County: Hanlon-Buchanan, Inc., 1-E Johnson Bros., 2 mi. W of Jacksboro, dry at 5,995 ft.

Wichita County: W. H. Peckham 1 Taylor, John W. Harris subd., dry at 1,378 ft.

Young County: Valley Osage Oil Co. 1 W. C. Leberman, TE&L Sur., dry at 1,025 ft.

Hanlon-Buchanan, Inc. and Auto-Ordnance Co. 1-F B. W. King, 4 mi. NW of Graham, 10.42 bbl., 43 bbl. Bend lime pay 3,840 ft., perf. 3,840-50 ft., PB to 3,980 ft., TD 4,737 ft. Discovery.

WEST CENTRAL TEXAS

ABILENE, Tex.—Phillips Petroleum Co. 1 Laura Wild, between the Loving and Ibex pools of western Stephens County, total depth 4,375 ft., recovered 50 ft. of oil-cut mud on drill-stem test at 4,373-75 ft. in dolomite. This wildcat had shows of oil at 4,015 ft. in conglomerate, and in tight dolomite at 4,360-68 ft. In Shackelford County, on the west side of the Ibex field, Phillips abandoned its 1 Buford, Blind Asylum land, at 4,502 ft. in the Ellenburger after plugging back and testing several horizons. Roeser & Pendleton and Continental abandoned 2-A-145 W. I. Cooke estate at 3,560 ft. This was a Palo Pinto test, topping the lime at 3,131 ft. Southeast of Albany, Shell Oil Co., Inc., will drill another Ellenburger test, only ¾ mile southeast of a recent failure to this horizon.

The new test will be Shell 1 Leschbern, Section 34, Blind Asylum land. In Eastland County, on the southeast outskirts of the city of Ranger, North American Oil Consolidated has abandoned its 1 Hodges at 3,342 ft. in shale. This well had a good show of oil in the top of the Ranger lime, but after casing was run it failed to kick off, and it was believed that the pay had been cemented off.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Coleman County: E. J. Cunningham and H. F. Wilcox Oil & Gas Co. 1 J. W. Roberts, 330 ft. from N and E 160-ac. lease, O. H. Gibbs Sur., 2½ mi. SE Fisk, elev. 1,709 ft., dry at TD 2,358 ft.

Haskell County: Hunter & Hunter 1 John D. Hughes, 1,830 ft. from S, 660 ft. from W, M. Trevieso Sur., Palo Pinto lime 3,278 ft., dry at TD 3,342 ft.

Mills County: J. Garfield Buell 1 Barnes & McCullough, 2,640 ft. from N and E, Sec. 3, ET Ry. Sur., dry at TD 3,518 ft.

APPALACHIAN FIELDS

Little Wildcatting Under Way in Shallow Areas

PITTSBURGH, Pa.—Except in Fayette County, little wildcatting is under way in the shallow areas, and until there is marked improvement in the price structure of Pennsylvania Grade crude, most of the field extensions are likely to be gas wells. In the search for deeper horizons, where surface work shows a distinct and large closure such as on pronounced structures like Chestnut Ridge, Laurel Ridge and the Accident dome, each well is a wildcat, and often safe-appearing locations turn out to be down-structure owing to low-angle faults or block faults. In spite of many failures, search is continuing, and it is expected additional locations will be announced early this year.

In West Virginia, Pittsburgh & West Virginia Gas Co. completed a fair gas well in the Otter district, Braxton County, 7,979 J. E. Horner, with a gage of 1,565,000 cut. ft. of gas from the Salt sand. Total depth is 1,863 ft. In Marshall County, Manufacturers Light & Heat Co.'s test on the W. Holmes farm in Webster district, topped the Gas sand at 1,082 ft., and gaged final open flow of 1,300,000 cu. ft. of gas at total depth of 1,090 ft.

In Tucker County, Ohio Oil Co. has stopped fishing with the rotary in the test on the Kammerling tract in Dry Fork district, and is waiting for equipment to survey the hole. The crew is unable to wash over the stem of the cable tools, lodged below the bottom of casing set at 7,777 ft. It is believed the tools were pushed down the hole enough to permit sidetracking them.

In Wood County, Hope Natural Gas

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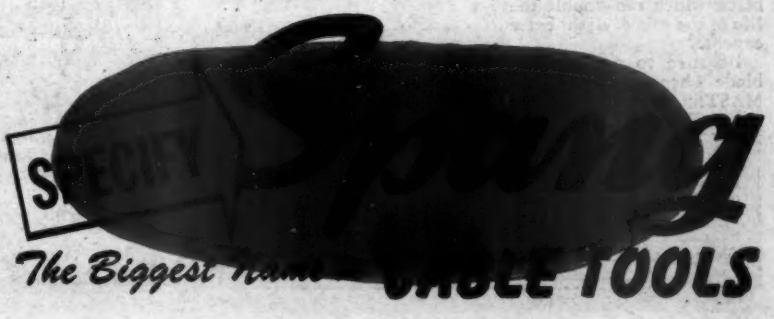

Co. reached 2,800 ft. in the Oriskany test on the Big Run Oil Co. tract in Williams district, with no Berea found.

In southwest Pennsylvania, the test of Lewis & Pettit on the Samuel Garber farm in South Strabane Township, Washington County, was completed for 800,000 cu. ft. of gas in the Second Salt sand at total depth of 1,656 ft.

ROCKY MOUNTAIN

Fremont County Well Has 1,500 Ft. of Oil in Tensleep

DENVER, Colo.—The Rocky Mountain area had an active week which resulted in discoveries, the conclusion of important deals, and increases in the number of wells completed. The newest discovery was made by the Stanolind Oil & Gas Co. in 1 Shoshone-Arapaho, SW SE SW 18-2n-1w, in the Tensleep, on Winkelman dome, Fremont County, Wyoming. It topped the Tensleep at 2,878 ft. and stopped at 2,913 ft. for a drill-stem test at 2,887-2,913 ft. The tester, open for 1½ hours, showed 1,500 ft. of oil and no water. The structure is a faulted anticline with 300 ft. of closure and lies just to the south of the Pilot Butte and Steamboat Butte fields, the first named being a discovery in the Tensleep 2 years ago and the other a discovery in the Sundance last year. It previously had been explored by two wells which had gas in the Morrison sand at around 945 ft., but had not been tested below that horizon. Stanolind acquired the lease on 960 acres in Sections 18 and 19 last August on a high bid of $25.60 an acre bonus and 12½ per cent royalty.

Garland dome shows oil in Tensleep.—Two wells 4 miles apart on the Garland dome in Park and Big Horn counties definitely proved existence of an oil belt in the Tensleep below the gas cap and indicate that at least 2,000 acres will be productive in that horizon. The most northerly well is Ohio Oil Co. 5 Ohio-Kinney-Coastal unit, NW SW SW 13-56n-98w, which had the top of the Tensleep at 4,349 ft., and on drill-stem test at 4,350 to 4,455 ft., open 15 minutes, the oil rose at the rate of 7 bbl. an hour. The other well, General Petroleum Co. 1 Howell lot, 63-56n-97w (approximately SW SE Section 32), 4 miles to the southeast, had the top of the Tensleep at 4,314 ft. and drilled to 4,438 ft. On a drill-stem test, open 15 minutes, 39 stands of oil were recovered. First reports indicated it was swabbing from 35 to 40 bbl. an hour of 25-gravity oil. The General Petroleum well is the lowest on structure of the two. It had little fluid in the first 30 ft. of the Tensleep, but porosity began to improve, with the best oil showing at 4,331-83 ft. The Kinney-Coastal well found the sand hard and tight but a thicker zone of saturation. Location is being made for a second well on the Ohio-Kinney-Coastal unit. It is generally conceded that these two wells indicate the Tensleep will be productive of oil below the gas around the structure, but how far out the water line lies is still to be determined.

Water line at Elk Basin.—The first well in Elk Basin to find water in the Tensleep is Stanolind Oil & Gas Co. 1 Garth, NE NE NE 26-58n-100w, ¾ mile west of the nearest producer and 1¼ miles from the top of the structure. It tested the Tensleep at 6,156-70 ft., open 30 minutes, and water rose 3,160 ft. It will go to the Madison.

Little Buffalo Basin.—Stanolind Oil & Gas Co. 1 Unit, SW SW NE 34-48n-100w, swabbed 2½ bbl. of water per hour from the Tensleep at 5,042 to 5,326 ft., and is drilling ahead at 5,536 ft. and feeling for the Madison. It had the top of the Amsden at 5,300 ft. Location is 3½ miles northwest of the Goodstein discovery well in the Tensleep. Stanolind has made a location

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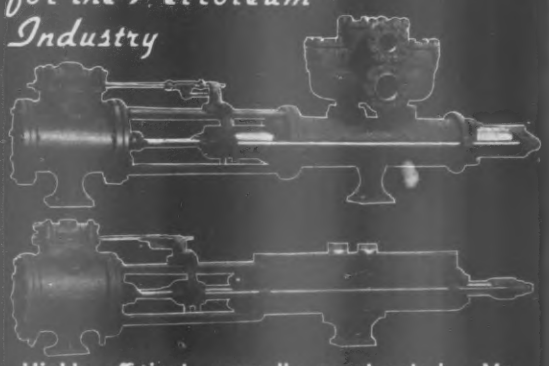

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for 2 Unit, NE NE NW 12-47-100, a mile north of the discovery.

Water line at Frannie.—Continental Oil Co. 1-E Mau, SE NE SW 25-58-98, Frannie field, had water in the Tensleep at 2,683-2,754 ft., and will go to the Madison. It is an outpost ¼ mile southeast of nearest production.

Gage field extended.—Northern Ordnance, Inc. 1 Darr, C SE NE 14-9n-26e, Gage dome, Musselshell County, Montana, 1¾ miles northeast of the discovery, a near completion, swabbed 488 bbl. of 33.9-gravity crude first 24 hours and 405 bbl. the second period from Amsden at 6,087 to 6,125 ft. The discovery pumped only 25 bbl. from the Amsden. Same company's 1 Suzanne, 3½ miles southeast of the discovery, topped the Amsden at 6,125 ft., and is testing. It is a "tight" well for the present.

COLORADO COMPLETIONS

Clark's Lake, Larimer County: Amerada Petroleum Corp. 1 Hartshorn, SE NE SW 15-9n-68w, joint with Alder Oil Co., TD 6,510 ft., in Sundance, water, top 6,485 ft., water in Dakota at 6,112-63 ft., PB to Muddy sand at 5,888-5,969 ft., swabbed 168 bbl. fluid, 99 per cent oil, on Feb. 2, fluid level 4,500 ft., building tanks for production test.

ILLINOIS

Record Well Completed At North Markham Pool

CENTRALIA, Ill.—One of the largest initial producers in the past 12 months is Sinclair-Wyoming Oil Co. 2 McCombs, C NW SW 18-2s-3e, in the Wayne County side of the North Markham City pool. The well found production in McClosky lime at 3,054-69 ft. It swabbed 598 bbl. in 24 hours before it was acidized. After a 5,000-gal. treatment the well was completed for 1,423 bbl., flowing, in 24 hours.

The only other large new producer of the week was Carter Oil Co. 1 A. A. Miller, NW NE NE 28-6s-10e, in the Concord pool in White County, which swabbed 480 bbl. in 24 hours from Tar Springs sand at 2,261-70 ft. and 2,272-74 ft.

Eighteen oil wells and six dry holes were completed during the week. Thirty-two new operations were started, including six wildcats. The pool opened in January by Felix Jablonski 1 Yorndorf, C NW NW 3-1n-9e, Wayne County, with a 49-bbl. pumper, has been named the North Mount Erie pool.

ILLINOIS WILDCAT COMPLETIONS

Kendall County: Herndon Drilling 1 Proctor, NE NE SE 36-36n-8e, hole junked at 2,228 ft.

Lawrence County: Clark C. Nye 1 Crane, NW NW NW 33-3n-12w, dry at 2,215 ft. Upper Glen Dean 1,667 ft., Cypress 1,959 ft., Upper Renault 2,028 ft., McClosky 2,121-24 ft.

Union County: Nation Oil 1 Gray, SE NW SE 2-11s-1e, dry at 1,949 ft. Upper Kin-

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Alexander County: Whitebread & Kipping 2 L. Minton, SW SW SE 4-15s-2w, dry at 342 ft.

PERMIAN BASIN

Two-Mile Extension Seen For Keystone-Holt Pool

MIDLAND, Tex. — Casing was cemented at 5,032 ft. in Sun Oil Co. 3 J. B. Walton, Keystone-Colby pool, Winkler County. This well, being deepened from 3,372 ft., where it produced from the Colby sand, showed first porosity and stain at 4,940-60 ft. in cores. On drill-stem test at 4,989-5,000 ft. with ⅝-in. choke, it showed 240 ft. of oil and gas-cut mud in 30 minutes. It was cored to total depth of 5,033 ft., showing porosity and stain, bleeding oil in cores, and showing broken staining and saturation. This well is a little over 2 miles southwest of the Keystone-Holt discovery, Richardson & Bass 4 J. B. Walton, and 3½ miles southwest of the Keystone-Ellenburger discovery well. It is also 2 miles southeast of Magnolia Petroleum Co. 21 State-Walton, which extended Ellenburger production in the Kermit-Ellenburger pool 1 mile south last week.

On the latest test this well made 151.5 bbl. oil and 5 per cent water in 14 hours through ¼-in. choke. Oil tested 43.4 gravity. Previously the well had flowed 330 bbl. in 23 hours. Total depth is 10,680 ft. One-half mile west of the discovery, Magnolia has staked No. 22 State-Walton.

Yoakum County.—Woodley Petroleum Co. 1 Mittie Palmer, 2 miles north of the Wasson pool, on potential test pumped 134 bbl. oil from pay at 5,203-19 ft., plugged back from total depth 5,333 ft. Humble Oil & Refining Co. 1 Fillingim, SE NE, Section 661, northwest of Wasson production, was reported to be running high with top of San Andres called at 4,580 ft. It was drilling below 5,108 ft., momentarily expecting top of the Wasson pay. Hickok & Reynolds 1 Bain Price, wildcat in Gibson Survey, was fishing for tools at 5,031 ft.

Howard County. — Cosden Petroleum Co. and W. S. Guthrie 2 Pauline Allen, deep pay prospect in Vincent area, was preparing to drill to 6,200 ft. from present depth of 5,617 ft. This test had made a head of oil while running casing, and had swabbed 4½ bbl. of oil an hour on tests of the lower Clear Fork lime. Final completion for a new pool opener 7 miles west of Big Spring, John B. Hawley 1 Cook was pumping 13 bbl. of oil per day with 7 bbl. of water at total depth of 3,555 ft.

Andrews County.—Humble 1 Scarborough, 14 miles southwest of Fullerton pool, had show of oil and gas in samples from top of Fullerton pay at 7,034-46 ft., and drilled ahead to 7,202 ft., where it is temporarily shut down for motor repairs. Magnolia Petroleum Co. 1 Logsdon, ½ mile south of the discovery in the East Fullerton pool, flowed 177 bbl. in 6 hours after treatment with 6,000 gal. of acid.

WEST TEXAS WILDCAT COMPLETIONS

Garza County: M. L. Richards et al 1 K. Stoker, GH&H Ry. Sur., dry at 2,944 ft.

Hale County: Amerada 1 W. W. Kurfees, H&OB Sur., San Andres 2,440 ft., San Angelo 3,730 ft., Pennsylvanian 5,860 ft., SG 9,880-9,910 ft., granite 10,150 ft., solid granite 10,225 ft., dry at 10,250 ft.

Howard County: John B. Hawley, Jr., 1 J. W. Cook, 7 mi. W of Big Spring, pumping 13 bbl., 25.4 gravity, lime pay 3,193 ft., perf. 3,143-3,202 ft., TD 3,555 ft., PB to 3,290 ft. Discovery.

Mitchell County: Shamrock Oil & Gas 1 Ellwood est., SP Ry. Sur., San Angelo 1,945 ft., Ellenburger 7,960 ft., dry at 8,125 ft.

Reagan County: Cooperative Refinery (was National Refining) 1 Merchant heirs, L&SV Ry. Sur., dry at 3,527 ft.

Yoakum County: Woodley Petroleum 1 Mittie Farmer, J. H. Gibson Sur., San Andres lime pay 5,203-19 ft., TD 5,333 ft., PB to 5,319 ft. Discovery.

SOUTHEAST NEW MEXICO

HOBBS, N. M. — Six completions, two oil wells and four dry holes, were reported during the past week. Temporarily abandoned was DeKalb Ag-

ricultural Association 1 White, 35-10s-28e, Chaves County, at total depth of 7,515 ft. The well was estimated good for 20 bbl. per day in lime pay at 3,500-50 ft.

Humble Oil & Refining Co. 1-N State, Manning Dome test in 35-14s-17e, Chaves County, was drilling past 3,152 ft. after plugging back to straighten hole. In southeastern Lea County, Humble's 1 Federal-Leonard, Ellenburger wildcat, was drilling below 9,237 ft. in lime and chert.

SOUTHEAST NEW MEXICO WILDCAT COMPLETIONS

Chaves County: DeKalb Agricultural Association 1 J. P. White, 35-10s-28e, dry at 7,515 ft.

Eddy County: P. B. English 1 Hinkle, 22-19s-31e, dry at 2,551 ft.

Yates & Stroup 1 State, 16-19s-30e, dry at 2,012 ft.

OKLAHOMA

Wilcox Discovery Flows in Excess of 100 Bbl. of Oil

ATLANTIC REFINING CO.'s Wilcox discovery in Logan County came up to expectations late last week when it made a flow of 101 bbl. of oil in 18 hours. Forty barrels of mud had been pumped into the well and at the end of the 18-hour test only half of the mud had been recovered so that this flow was not a true indication of the potential. Additional tests were to be made throughout the week. The well, 1 Kerfoot in SE SE NE 31-18n-3w, made the flow through open tubing from final perforations at 6,271-76 ft.

Oklahoma County.—Completion of George Dickey's 1 Young, northwest extension to the West Edmond pool, heightened interest in the area and sent leasing prices to as high as $1,500 an acre within the field and to $900 for undrilled locations. Reserve estimates have been revised upwards for the field, the latest giving it a 15,000-bbl. recovery per acre. The 1 Young, in the Hunton lime at 7,000-20 ft., made a flow of 222 bbl. in 12 hours through ⅝-in. choke and 300 bbl. in 24 hours through ¼-in. choke before being pinched in to its allowable of 300 bbl. a day. Gravity of the oil is 41.5°.

Cleveland County. — First correlations on the Oswego lime at Mid-Continent 1 Tubbs, NE SW SE 29-10n-3w, east offset to the discovery at West Moore, placed it some 30 ft. higher structurally. Tops on the Oswego at the 1 Tubbs and the 1 Harris were 7,450 ft. and 7,475 ft., respectively. Well elevation at the discovery was 1,205 ft. and 1,211 ft. at the Tubbs.

Pottawatomie County. — According to late reports, Stanolind Oil & Gas Co. extended Hunton lime production

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southeast of the McComb area and southwest of Romulus townsite at its 1 Werell in NW NW NW 9-7n-3e. The Hunton was topped at 4,547 ft. and cores to 4,552 ft. indicated good shows of oil and some porosity. At total depth of 4,561 ft. a 1-hour drill-stem test recovered 1,500 ft. of oil and 150 ft. of drilling mud. Further tests will be made after cleaning out.

Oklahoma County.—About 8 miles east of Northeast Edmond, in the northeast corner of the county, Jordan Petroleum Co. 1 Bourne, SW SE NE 14-14n-1w, was reported to have swabbed 45 bbl. of oil with some water from the Simpson dolomite and first Wilcox zones. Top of the Simpson was 5,792 ft., with the Wilcox at 5,818 ft. Total depth is

OKLAHOMA WILDCAT COMPLETIONS

Canadian County, N W extension to West Edmond: Geo. Dickey 1 Young, SE NE 25-14n-5w, flowed 222 bbl. in 12 hr., 5/8-in. choke, gravity 41.5, Hunton 7,000-20 ft., TD 7,110 ft.

Grant County: Amerada Pet. 1 Newkirk, SE SE NW 10-26-3w, dry, TD 5,017 ft., Layton 3,778 ft., Wilcox 4,996 ft.

Hughes County: SE of small sand well: Bales & Delaney 1 White, NE SW NE 28-6n-8e, dry, TD 2,755 ft., Booch 2,722 ft. Deep Rock 1 Fixico, NW NE SW 1-6n-10e, dry, TD 4,660 ft., Cromwell 4,366 ft.

OHIO, KENTUCKY

Ashland County Gas Well Makes High Potential

ZANESVILLE, Ohio.—An unusually large gas well for the Ashland field was completed by Carl Robinson et al on the Philip Doerr tract in Section 16, Lake Township. The Clinton was found at 2,975-93 ft. and gaged 12,000,000 cu. ft. with the bulk of the gas in the top half of the sand. The well will encourage more drilling in the west part of the township.

Benedum-Trees discovered a small gas well in the wildcat in Mentor Township, Lake County, on the Hawgood farm in Lot 10. The Red Clinton at 2,936-90 ft. showed a little gas, the white at 3,011-14 ft. was dry, and the white at 3,021-26 ft. had a small pay. The well was shot and shut in at 110,000 cu. ft. The company has staked another well in the township in Lot 3, Tract 6.

OHIO WILDCAT COMPLETIONS

Coshocton County, Virginia Township: S. E. Large 1 G. W. Norris, Lot 14, Clinton 3,550 ft., dry, T.D. 3,671 ft.

Lake County, Mentor Township: Benedum-Trees 1 N. S. Hawgood, Lot 10, Clinton 2,936 ft., 3,011 ft., 3,021-26 ft., 110,000 cu. ft., T.D. 3,515 ft.

WESTERN KENTUCKY

OWENSBORO, Ky.—Hiawatha Oil & Gas Co. was testing Cypress sand on the pump in 1 Uniontown-Bland, in Union County, after the swab brought up a 24-hour production of 350 bbl. of oil from pay at 2,154-79 ft., total depth. Same company's 10 Uniontown also had Cypress sand at about the same depth and pipe had been set at 2,155 ft. Ashland Oil & Refining Co. et al 2 A. H. Johnson, in Union County, swabbed 285 bbl. of fluid, 90 per cent oil, from McClosky lime at 2,829-37 ft. Two oil wells, one gasser and one dry hole were completed in western Kentucky during the week. No wildcats were completed.

EASTERN KENTUCKY

ASHLAND, Ky.—One oil well and one gas well were completed in Eastern Kentucky. One new location was made and the weather favored building of roads to several other locations. Rocky Branch Syndicate completed 1 Leonidas Skaggs, on Newcomb Creek in Eliott County, producing 5 bbl. of oil daily at 931 ft. Kentucky-West Virginia Gas Co. completed 5,509 John F. Burchett, on Cow Creek in Floyd County at 1,419 ft., in Big lime, with a daily open flow of 355,000 cu. ft. of gas.

INDIANA

EVANSVILLE, Ind.—Five oil wells and one dry hole were the results of field operations in Indiana in the past week. Four of the completions were in Gibson County, the best of the crop being Superior Oil Co. 1 Permela Massey, NW NW SE 25-2s-12w, good for 113 bbl. on the pump from Cypress sand at 2,035-44 ft.

INDIANA WILDCAT COMPLETION

Sullivan County: Farm Bureau 1 Alva Taylor, C NW NW 8-9n-9w, dry at 2,300 ft. (estimated depth).

MISSISSIPPI

Gulf Completion May Open Another Major Oil Field

JACKSON, Miss.—Gulf Refining Co. completed 1 Ellen Morrison to open what may become another major oil field for Mississippi. The new producer is in 30-1n-13e, Jasper County. With no shows of value in the Tuscaloosa or Davis zones at total depth of 6,578 ft. the 7-in. casing was set at 5,075 ft. and perforations were made at 4,958-68 ft. The well was completed for 143 bbl. of pipe-line oil in 12 hours through 3/8-in. choke, with tubing pressure of 130 lb., gravity 19, and was shut in for storage. Previous to completion it had flowed 470 bbl. in 24 hours on drill-stem test, using 3/8-in. chokes top and bottom. Sun Oil Co. has entered the field by staking location for 1 Mack Lindsey in 31-1n-13e. The field is named Heidelberg.

MISSISSIPPI WILDCAT COMPLETIONS

Clarke County: C. L. Higgason 1 W. J. Lane, 14-1n-16e, top Tallahatta 490 ft., Wilcox 806 ft., Midway 2,550 ft., Selma

3,023 ft., Eutaw 4,060 ft., Tuscaloosa 4,562 ft., Marine Tuscaloosa 5,328 ft., Basal sand 5,484 ft., abandoned at 5,626 ft.

Issaquena County: Sun Oil Co. 1 Haynes & Johnson, 1-9n-8w, location abandoned.

KANSAS

Barton County Discovery Is in Arbuckle Lime

THE TEXAS CO. 1 Harper, NW NW 10-18-14w, was being put on the pump after swabbing 13½ bbl. of oil an hour in Arbuckle lime at 3,438-44 ft. This wildcat had the Kansas City lime at 3,120 ft., found a show of oil in cores at 3,335-38 ft. and filled 2,000 ft. with oil in 3 hours, with no water after setting 5-in. pipe to 3,440 ft. Total fillup was 2,900 ft. Location is about 2 miles west and north of Cities Service Oil Co. 1 Eveleigh, a 425-bbl. Sooy sand well at 3,299-3,311 ft.

Rooks County.—The fourth discovery for the county this year, Continental Oil Co. 1 Welch, NE NE NE 33-8-18w, was given a potential of 714 bbl. of oil a day from the Lansing-Kansas City lime topped at 3,127 ft., with production at 3,209-21 ft. Continental originally drilled this test to 3,456 ft. as a stratigraphic test and abandoned it without running casing. Tools were moved in and work resumed the first of January.

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.08

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

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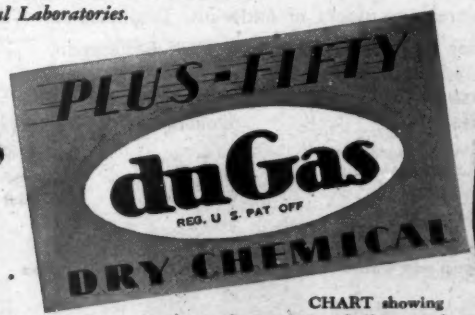

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SIX OIL DISCOVERIES REPORTED LAST WEEK

	Week ended February 12, 1944					Cumulative total for 1944				
	Oil	Distillate	Gas	Dry	Total	Oil	Distillate	Gas	Dry	Total
Ohio	0	0	1	1	2	0	0	3	6	9
Indiana	0	0	0	1	1	0	0	0	3	3
Kentucky	0	0	0	0	0	0	0	0	10	10
Illinois	0	0	0	4	4	2	0	0	34	36
Michigan	0	0	0	6	6	1	0	0	22	23
Kansas	0	0	0	7	7	2	0	0	41	43
Nebraska-Missouri-Iowa	0	0	0	0	0	0	0	0	6	6
Oklahoma	1	0	0	3	4	4	0	1	19	24
Texas:										
North Central	1	0	0	8	9	5	0	0	36	41
West	2	0	0	4	6	4	0	0	17	21
Panhandle	0	0	0	0	0	0	0	0	1	1
East	0	0	0	3	3	0	0	0	20	20
Gulf Coast	1	1	1	6	9	7	3	2	24	36
Southwest	0	0	1	3	4	5	0	3	30	38
Total	4	1	2	24	31	21	3	5	128	157
Louisiana:										
North	0	0	0	0	0	0	0	0	4	4
Gulf Coast	0	0	0	2	2	1	2	0	9	12
Total	0	0	0	2	2	1	2	0	13	16
Arkansas	0	0	0	2	2	0	0	0	6	6
Mississippi and Southeast	0	0	0	1	1	2	0	0	14	16
Montana	0	0	0	0	0	0	0	0	2	2
Wyoming	0	0	0	0	0	0	0	0	2	2
Colorado, Utah	1	0	0	0	1	1	0	0	1	2
New Mexico	0	0	0	3	3	0	0	0	9	9
California	0	0	1	3	4	0	0	3	17	20
Total United States	6	1	4	57	68	34	5	12	333	384
Total previous week	5	0	0	51	56					

SIX discovery wells completed the past week included good wells each in Colorado, the upper Gulf Coast area of Texas and Oklahoma. An unusual number of gas discoveries was also made.

In Canadian County, Oklahoma a prolific Hunton lime area was extended 1 mile; also giving the county its first commercial production. The well, George Dickey 1 Young, flowed as high as 300 bbl. a day through choke. As a result of this and other edge wells, the field's proven reserves were revised upward.

Colorado's Larimer County discovery, drilled by Amerada Petroleum Corp. and Alder Oil Co., swabbed 168 bbl. of oil but was to continue testing when additional tanks are built. Production is in the Muddy sand at 5,888-5,969 ft.

In Fort Bend County, Texas, Phillips Petroleum Co. 5 Robinson-Bashara extended production to the southwest of the Blue Ridge salt dome field. The new well flowed 186 bbl. of oil a day through $\frac{1}{4}$-in. choke, in sand at 3,868-73 ft.

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LA.-ARK.

Holly Ridge Outpost Has Salt Water in Tuscaloosa

SHREVEPORT, La.—The Carter Oil Co. 1 Marks, NW NE 19-11n-10e, a northeast edge well at the Holly Ridge pool in Tensas Parish, was reported to have found water in the Shelly sand of the Tuscaloosa series. Top of the sand was 8,375 ft., with total depth at 8,431 ft.

Carter and Stanolind Oil & Gas Co.'s joint operation at the south offset to the discovery well was drilling below 8,000 ft. It is the 1 Smith-Glover in NW SE 10-11n-10e. The well was delayed by a fishing job and also to set an additional string of casing at 3,145 ft. to seal off a break.

ARKANSAS WILDCAT COMPLETIONS

Ashley County: Union Producing Co. 1-D Crossett, NE SE NW 13-18s-9w, dry, TD 2,863 ft. Union announced location for a new test at the 2-D Crossett in 3-18s-9w, as another in a series of exploratory tests of this area.

Nevada County, N of Stephens pool: Magnolia Petroleum Co. 1 Lester, NE SW 36-14s-20w, dry, TD 5,475 ft.

MONTHLY WILDCAT COMPLETION RECORD, NOVEMBER-JANUARY

	Oil			Distillate			Gas			Dry			Total		
	Nov.	Dec.	Jan.	Nov.	Dec.	Jan.	Nov.	Dec.	Jan.	Nov.	Dec.	Jan.	Nov.	Dec.	Jan.
Ohio	0	0	0	0	0	0	2	2	2	5	7	4	7	9	6
Indiana	1	1	0	0	0	0	0	0	0	3	3	2	4	4	2
Kentucky	1	2	0	0	0	0	0	0	0	3	7	7	4	9	7
Illinois	10	5	2	0	0	0	0	0	0	27	39	24	37	44	26
Michigan	1	0	1	0	0	0	1	1	0	25	23	16	27	24	17
Kansas	4	4	2	0	0	0	0	0	0	39	36	24	43	40	26
Nebraska-Missouri-Iowa	0	0	0	0	0	0	0	0	0	0	2	5	0	2	5
Oklahoma	3	1	3	0	0	0	0	3	1	20	14	14	23	18	18
Texas:															
North Central	4	9	3	0	0	0	0	0	0	30	44	23	34	53	26
West	4	0	2	0	0	0	0	0	0	7	18	11	11	18	13
Panhandle	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1
East	0	0	0	0	0	0	0	0	0	5	11	14	6	11	14
Gulf Coast	0	4	5	0	1	2	0	2	1	28	20	13	28	27	21
Southwest	0	6	5	0	0	0	0	3	2	18	24	21	18	33	28
Total	8	19	15	1	1	2	0	5	3	89	117	83	98	142	103
Louisiana:															
North	1	0	0	0	0	0	1	0	0	6	7	4	8	7	4
Gulf Coast	2	1	0	1	2	2	0	0	0	3	2	6	6	5	8
Total	3	1	0	1	2	2	1	0	0	9	9	10	14	12	12
Arkansas	0	1	0	0	0	0	0	0	0	5	4	3	5	5	3
Mississippi	1	0	0	0	0	0	0	0	0	12	9	11	13	9	11
Montana	2	0	0	0	0	0	3	0	0	3	3	1	8	3	1
Wyoming	0	2	0	0	0	0	0	1	0	0	0	2	0	3	2
Colorado, Utah	0	0	0	0	0	0	0	0	0	2	2	1	2	2	1
New Mexico	1	0	0	0	0	0	0	0	0	3	4	5	4	4	5
California	1	1	0	0	0	0	0	1	2	13	12	13	14	14	15
Total	36	37	23	2	3	4	10	13	8	258	291	225	303	344	260

White Succeeds Franks as President of Franks Mfg. Co.

Carl White, Jr., has been elected to the presidency of Franks Manufacturing Co., Tulsa, following his purchase of the stock interest of H. H. Franks, who is retiring from business. Franks and White have been coowners of the business since its organization in 1930.

Stock interest under the new setup is being acquired by A. W. Conwell, who becomes vice president and plant manager, and Joe Bowman and W. B. Woody, who remain as secretary-treasurer and chief engineer respectively. Three three men with White, who has been vice president and sales manager, form the board of directors of the firm.

In recognition of the change, employes held a farewell buffet supper in honor of Franks and presented him with a complete silver service set. W. C. Newhouse, one of the firm's oldest employes and foreman of the structural shop, made the presentation. The set was inscribed as follows: "To H. H. Franks, Our Old Man, from the Employes of Franks Manufacturing Corporation."

Since 1942, the corporation has been constructing barrage-balloon winches and cranes for tractors for the war effort in addition to supplying the petroleum industry with as many portable-drilling and well-servicing units as could be produced from the limited materials available. In respect to its war work, the corporation recently received the commendation of the U. S. District Engineers Office in Tulsa for high efficiency.

Policies of the corporation will remain unchanged, White has indicated, and added that "for some time we have been planning greater standardization and are working on revolutionary improvements for immediate and postwar business. This will continue."

Franks' retirement comes after serving more than 50 years in the machine manufacturing business. Born in Lockhaven, Pa., he gained early experience in shops in that area prior to coming to Oklahoma.

White, a graduate of Yale University in engineering, spent his youth in Chattanooga, Tenn. He has had equipment experience in South America and Russia, and came to the Mid-Continent area in 1928.

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Among the Drilling Contractors

B. M. McGraw, Carmi, Ill., is drilling Carter Oil Co. 5 Henry R. Skiles, 15-8s-15w, Posey County, Indiana.

M.B.K. Drilling Co., Tulsa, has received contract to drill National Refining Co. 1 E. W. Cope et al, 20-36-4n, T.&P. Survey, Dawson County, Texas, 12 miles south and slightly west of Lamesa.

Rowan Drilling Co., Fort Worth, Tex., has a contract to drill a 5,500-ft. wildcat for Seaboard Oil Co. of Delaware in northeast Dickens County, Texas. It will be Seaboard Oil 1 Pitchfork Land & Cattle Co.

Likens & Hall, Midland, Tex., have finished as a dry hole Ralph Lowe 1 fee, in Andrews County, Texas, northeast of Fullerton pool. The wildcat went to total depth of 7,839 ft. and had only nominal shows in the Fullerton pays.

Stewart Merrill has taken contract to drill the J. V. Wicklund Development Co. 1 Arthur G. Carolan, in C N½ SE NE, Tuscola County, Michigan.

Robert W. Atha has contracted to deepen the Leonard and Rawmor 1 Miltner, in S½ SW SE 1-20n-6w, Clare County, Michigan. When drilled last year the hole was carried in such a manner as to permit deepening to the 5,100-5,300 ft. Richfield section if found desirable. It was completed last September for a Dundee discovery well at 3,840 ft. Rotary rig will be used.

Palmer Drilling Co. is the contractor on Texas Mineral Land Co. 2 E. P. Lee, new test at Holly field in DeSoto Parish, Louisiana, in 33-14n-13w, a 2,900-ft. test.

Loffland Bros., Houston, Tex., have the contract to drill Continental Oil Co. 1 Prairie Land & Canal Co., wildcat in the East Moss Lake area of Calcasieu Parish, Louisiana, in 2-11s-9w. It is a 10,600-ft. test and rig is being installed.

O. W. Dyer, Houston, Tex., has the contract to drill Gulf Refining Co.'s new Wilcox test on the south flank of Pine Prairie dome in Evangeline Parish, Louisiana, the 8-A, Tract 1 Schlicher-Thomas Co., in 3-4s-1w.

T. G. & M. Drilling Co. will drill for Arkansas Fuel Oil Co. 1-B Lyons, in the Runge area of Karnes County, Texas. This is a 6,700-ft. Wilcox test in the D. C. Lyons, Jr. Survey A-382, 1,100 ft. northwest of the Runge discovery well.

Pioneer Drilling Co., Mount Vernon, Ill., is the drilling contractor on Carter Oil Co. 2 S. B. Buckman, in W½ SE SW 24-P-21, Union County, Kentucky, and was moving in materials to start operations.

Luling Oil & Gas Co., San Antonio, Tex., has received from H. B. Zachry Co. the contract to drill 1 C. S. Page in the West Cosden area of Bee County, Texas. Operator is moving in and rigging up on this test, which is 1,100 ft. southwest of the Brown discovery well in B. Q. Hadley Survey.

ROPE CONSERVATION NOTE BOOK—

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5061

James R. Norway has drilling contract on the Union Producing Co. 1-C King unit, in 17-21n-4e, Claiborne Parish, Louisiana. The test, which will go to 8,000 ft., was starting.

Harry Edwards Drilling Co., Houston, Tex., has received from Magnolia Petroleum Co. and J. S. Abercrombie Co. the contract to drill 1 Edward Aaron et al, in M. B. Nuckols Survey, Old Ocean field, Brazoria County, Texas. This test shows a proposed depth of 13,000 ft.

Graham Drilling Co., San Antonio, Tex., has signed a 50-well drilling contract with Pan-American Production Co., which assures a long-range program of development in the Willamar field, Willacy County, Texas. Total consideration involved was reported to be more than $1,600,000.

M. B. K. Drilling Co., Odessa, Tex., and Tulsa, have contracted to drill National Refining Co. 1 Mrs. Annie Harris, a 5,500-ft. wildcat in southwest Dawson County, Texas.

J. J. Broadus, of Centralia, Ill., is the drilling contractor on a deal reported closed between George W. Boyce, of Mount Vernon, Ill., and Continental Oil Co., whereby a well from Bozeman Land Co. tract in 23-3s-13w, Gibson County, Indiana, will be whipstocked and completed under the Wabash River in the Devonian limestone at about 4,650 ft. The test will be known as the 1 State of Indiana.

Harry L. Blackstock, drilling contractor who has been in South Texas and Illinois-Indiana areas since the Oklahoma and Edmond booms, is coming back to the West Edmond (Oklahoma) field with some contracts for Sohio Petroleum.

Installation of Butane Equipment Restricted

Petroleum Administration for War, through the Liquefied Petroleum Gas Section, has restricted all new installations of equipment (referring to internal-combustion engines) requiring additional quantities of butane as fuel for rotary oil-well drilling rigs. The decision states that ". . . because the military demand for aviation gasoline has seriously affected the supply and transportation of butane, it is necessary to restrict all new installations of equipment requiring additional quantities of this fuel. Therefore, new equipment for drilling rigs should be equipped to utilize gasoline fuels rather than butane."

Although the Government is permitting those contractors already having butane-burning engines to continue their use, engine distributors feel that the restriction will throw the current rotary machinery construction program out of balance. If the decision remains unmodified, manufacturers contend, a great deal of time will be lost through necessary changes and modifications of engines now built or being built. In some instances these modifications of necessity will extend into redesign of much drilling machinery in manufacture, it is shown.

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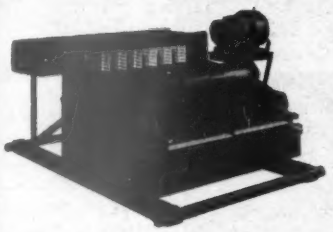

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RECTORSEAL is made especially for the oil industry, by men who know oil industry problems, to put an end to all costly gas, steam, water, oil and mud line leakage.

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Now! 30 and 50-Ton Hydraulic Jacks

No. 50HJ, capacity 50-tons. Two pumps, high and low speed, can be operated singly or in unison. No. 30HJ, same design, capacity 30-tons.

These new Simplex Hydraulic Jacks meet the need for faster lifting or moving of heavy loads. Construction is extra-rugged throughout, including base of special analysis steel. Exclusive double lever socket facilitates close quarter jacking. Write for descriptive bulletin.

Ask your field store.

Templeton, Kenly & Co.
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Better, Safer Oil Field Jacks Since 1899

Simplex
LEVER SCREW HYDRAULIC
Jacks

Market Developments

THE Office of Price Administration early this week completed the breakdown of Revised Price Regulation 88, putting all petroleum regulations for all levels, except retail, under four separate schedules, each dealing with specific segments of the industry's marketing operations.

Lubricating oils, greases, and certain other products, are now covered in Maximum Price Regulation 510. Revised Price Regulation 88 is redesigned as Maximum Price Regulation 88 and limited to gasoline, kerosene, fuel oils, diesel and tractor oils, naphthas, solvents and liquefied petroleum gas.

Fourteen changes in form of regulations and in definitions of terms are made in Schedule 88 and there are seven in Schedule 510. Detailed instructions for ascertaining maximum prices are included.

In spite of repeated warnings from Washington of impending distress in the East Coast petroleum-supply situation, recent developments indicate a slight improvement in conditions, the first to occur in several months.

Most of the concern has been centered on motor fuel. While stocks on the East Coast are still at critically low levels, they have shown a tendency to increase slightly in recent weeks indicating that current consumption is at the year's low. This increase, amounting to about 6 per cent in total, was far from sufficient to create any optimism.

Kerosene has also shown some improvement in recent weeks. Latest reports put the kerosene index at 51.6 which was a gain of about 13.5 per cent from the low reached in the week ended January 22.

Warnings were also sounded on domestic heating oil. Latest reports on gas oil and distillate fuel stocks show that the improvement which has been fairly consistent since the beginning of the season has been continued. At present these stocks are close to normal and, with rationing in effect, should be able to withstand demand for remainder of the season. Actually, since the beginning of the burning season, gas-oil and distillate-fuel stocks have risen 82.5 per cent.

Further indication of improvement on the Atlantic seaboard came from widely different points. The price of diesel oil at Buenos Aires, Argentina, Uruguay, Montevideo, and St. John's, Newfoundland, has been reduced as has the price of Bunker C at several Latin American ports.

Cold weather has quickened the demand for burning oils in the Mid-Continent and as the use of automobiles has tended downward, it has slowed up inquiries for motor fuel. Refiners and marketers are swamped with appeals for burning oils, but their stocks are depleted. In spite of the shortage of tank cars, enough have been available to move all the kerosene to the East Coast that District 2 refiners had for shipment.

Fuel oil, gas oil and gasoline stocks in the Pacific Coast area are being reduced at a rate exceeding 150,000 bbl. daily. Pacific Coast stocks of all oils have dropped below 100,000,000 bbl. for the first time in a number of years. Within the next 6 months inventories will reach the critical point. At the rate of consumption recorded during December 1943, the latest data available, fuel-oil stocks will be liquidated within 8 or 9 months and gas oil stocks will be exhausted in about 10 months.

A.P.I. Refinery Report

Week Ended February 5, 1944

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	147	3,166	388	852
Ind., Ill., Ky	752	17,296	3,129	5,472
Okla., Kan., Mo.	342	7,661	1,235	1,591
Censored area*	2,182	26,598	14,647	18,291
Rockies	105	1,799	612	380
California	798	15,264	32,523	9,567
Total 2-5 -44	4,324	81,784	52,734	36,153
Total 1-29-44	4,359	81,085	52,857	37,266
Total 2-6 -43	3,649	89,696	71,680	37,900

*Reports combined on East Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas at request of PAW.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
February 5, 1944	239,145,000
January 29, 1944	240,251,000
February 6, 1943	232,623,000

*Excludes unrefinable stocks in California.

REFINERY PRICE SUMMARY

(Prices as of February 15, 1944)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	80†	72-74	68-70	63-66
Mid-Continent*	‡6.00-6.25	5.750-6.000	.....	5.625
Gulf Coast	6.00-6.50	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.80	9.2	9.2	.....
California	.....	6.255-6.500	5.750-6.125	5.125-5.500

*Basis Group 3. †1939 C.F.R. (research method). ‡Inland Texas and adjoining counties in Arkansas and North Louisiana. §Unleaded.

KEROSENE AND DISTILLATE FUEL OIL

Product:	Kerosene†	No. 2	No. 3	No. 5	No. 6‡
Mid-Continent*	4.125-4.375	3.500-3.625	3.375-3.500	$0.85	$0.80-1.27
North Louisiana*	4.125-4.375	3.500-3.625	.....	.....	0.80-1.27
Pennsylvania	6.000-6.125	5.875-6.125	5.875-6.000	.....	.....
California	4.500-5.500	5.500	5.500	§1.10-1.25	§1.10-1.15
Northeast Coast	6.800	6.700	6.700	1.95	1.65
Gulf Coast	4.125	3.750-3.875	.....	1.35	0.85

*Reflecting OPA ceilings, depending on destination of shipments. †Quotations for 41-43 gravity. ‡Range depends on gravity. §Pacific Specification 300. ¶Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.875	5.500

LUBRICANTS

PENNSYLVANIA GRADE—

Bright stock,* 10 pour point	30.5
Bright stock,* 25 pour point	25.0
Steam refined, 600	15.0
Neutral oil,† 10 pour point	34.0
Neutral oil,† 25 pour point	28-32.5

*No. 8 color, 145-155 at 210, 540-550 flash. †150 vis. at 70° F., 3 color, 400-405 flash.

MID-CONTINENT—

Bright stock, 150-160 D, 0-10	23.00
Neutral oil,‡ 200-3	15.00

‡0 to 10 pour point.

GULF COAST—

Pale oil, 200-3	8.75
Pale oil, 500-3½	10.00

WAX

Oklahoma, 124-126, w.c.s.	4.250
Pennsylvania, 122-124, w.c.s.	4.250
NEW YORK (in bags)—	
Refined, 130-132 (A.m.p.)	7.00
Crude, 124-126 (W.s.)	6.00

TANK-WAGON PRICES

(Gasoline prices based on regular grades in cents per gallon.)

	Dealer tank wag.	Combined tax	Kero. tank wag.
Baltimore, Md.	15.95	5.5	10.5
New York	16.10	5.5	10.1
Philadelphia	16.20	5.5	11.9
Washington, D. C.	15.20	4.5	11.3
Chicago	14.10	4.5	10.6
Cleveland, Ohio	14.50	5.5	*9.0
Atlanta, Ga.	18.90	7.5	*11.5
Denver, Colo.	14.50	5.5	11.0
San Francisco	14.50	4.5	11.5
Tulsa	16.50	7.0	8.5

*Includes 1-cent state tax.

Equipment Progress

Fluid Packed Pump Co. Gives War Bonds as Prizes for a Pump Name

Fluid Packed Pump Co. is offering six war bonds as prizes for pump names. According to J. B. Reilly, president, the company was formed back in 1924 to manufacture fluid-packed pumps. But now that the company has become the world's largest exclusive oil-well pump manufacturer and makes a pump for every need, some confusion exists in oil men's minds as to the correct name for the various pumps. In order to clarify this situation, a new name will be selected which will identify its complete line of pumps.

First prize is a $1,000 war bond and the second, third, fourth, fifth and sixth prizes are $50 war bonds. The contest is open to all men engaged in production and drilling and men in the armed forces who were previously engaged in these branches of the oil industry. The contest closes at midnight, March 15, 1944.

Frick-Reid Distributor for J & L Oil-Country Tubular Products East of Rockies

A number of changes in Frick-Reid Supply Corp.'s organization have recently been made to permit a more direct service to all branches of the oil and gas industries on Jones & Laughlin oil-country tubular goods that this service may be on a par with Frick-Reid service maintained for so many years on oil and gas well supplies and in recent years enlarged to include process engineering and construction of refineries, gasoline plants, recycling, repressuring and other types of plants for the oil and gas industries.

R. J. Woods, Jr., formerly district sales manager, Jones & Laughlin Steel Corp., Tulsa, has been appointed manager of tube sales for Frick-Reid in the Mid-Continent area, with headquarters in Tulsa. S. R. Clinkscales, after 24 years of service with Frick-Reid, spent the past year with the Tulsa office of of Petroleum Administration for War and has now returned as assistant district manager of tube sales.

Henry J. McAdams, formerly tube salesman for Jones & Laughlin in New York City, has been appointed manager of Frick-Reid's New York office. O. P. Watkins, formerly tube salesman for Jones & Laughlin in Illinois, has been appointed to the same position with Frick-Reid in the Michigan district.

In the Gulf Coast area, T. L. (Dick) Lewis, who has been active in tubular-goods sales for many years, has joined the Frick-Reid organization as district manager of tube sales, with headquarters in Houston, Tex. G. E. Tyson and J. T. Batchelor have been transferred from the Jones & Laughlin organization to the Frick-Reid organization in Houston and appointed to the positions of salesman and chief clerk, respectively. F. D. Winslow, district sales manager for Jones & Laughlin at Houston, continues in charge of that territory on sales of mill products other than oil-country tubular goods.

A-1 Bit & Tool Co. Adds To Executive Personnel; Undergoes Expansion

C. L. Clausel, organizer of A-1 Bit & Tool Co., announces the recent purchase of the assets of Universal Core Barrel Co., the consolidation of the two companies under the operating name of A-1 Bit & Tool Co., Ltd., and the addition to the new company of J. R. (Dick) Yancey and Reagan J. Voss. Clausel is the executive head of the combined organization.

C. L. CLAUSEL

J. R. YANCEY

R. J. VOSS

Yancey is chief engineer for the new company. He was graduated from Rice Institute in 1930 as an engineer, and immediately went with Gray Tool Co. where he advanced to vice president. His work was designing and developing oil-field tools and equipment. Among his accomplishments was the developing of the method and the invention of the tools for valve removal under pressure. He is now engaged in the designing, developing and field testing of several new tools.

Voss is the chief administrative officer for the new company. Following a long association with the Cullinan interests he was employed by American Republics Corp., during which time he became secretary of Petroleum Building Co., manager of the Petroleum Building, and vice president of Petroleum Building Co.

The products of the A-1 Bit & Tool Co., Ltd., are: Bits, wire-line coring equipment, and casing milling tools. Several new tools now being field tested, will soon be ready for the trade.

A-1 Bit & Tool Co., Ltd., is active in California, Tri-State basin, coastal areas and in foreign fields with its casing milling tools, and serves the coastal area and foreign fields with its bits and wire-line coring equipment. The company maintains a field organization at all service points, except west of the Rockies, on casing milling, which is handled by Baash-Ross Tool Co. of Los Angeles. The export representative is I. Frank Brown, 30 Rockefeller Plaza, New York City.

Taylor Heads Research for Brooks-Wilson Agency

Frank B. Taylor has been elected vice president of the Brooks-Wilson Advertising Agency, Tulsa, in charge of engineering and technical research work. Taylor is past president of the Engineers Club of Tulsa and terminates 7 years association with the Oil Weekly, for which he was district editor, to accept his new position.

The association of Taylor with the agency, Leslie Brooks, president, announced, provides an expanded service. Complete facilities have been established for surveys in the industrial equipment field.

Trade Literature

Allis-Chalmers, Milwaukee, Wis.—Operation and Maintenance Review, Vol. 1, No. 1 of a pocket-size booklet devoted, as the name implies, to the problems of operating and maintaining equipment.

Classified Advertising

The Market Place for the Oil Industry

ROYALTIES

OIL AND GAS ROYALTIES for sale in Western Kentucky Coal Basin. Now leased to large producing company. For prices and particulars, write Box C-167, The Oil and Gas Journal, Tulsa, Okla.

WANTED

WANT small refinery, pumping jacks, tubing, tanks, tower and rotary. Box C-151, The Oil and Gas Journal, Tulsa, Okla.

OIL structure, Government data covering same. Want to drill two wells, attractive proposition open. Address P.O. Box 1373, Great Falls, Montana.

WANTED

GAS RECYCLING PROJECT

By large independent having available new, complete compression equipment capable of handling large volume and high pressures. Interested in high pressure wet gas area, good gasoline content, good reserves, sufficient wells already drilled for a recycling operation. Prefer project with gasoline extraction plant already operating but with limited market for residue dry gas. Give all information possible first letter. P.O. Box 1914, Fort Worth, Texas.

HELP WANTED

MANUFACTURER of well pumping equipment and gathering line, process and industrial pumps has opening for a young man (engineer preferred) who has decided that selling is his game and who can show proved or potential ability to sell machinery to the oil industry. An unusual opportunity available to the right man. Box C-124, The Oil and Gas Journal, Tulsa, Okla.

Wanted by Major Pipe Line Company
CIVIL ENGINEER, an excellent opening for an engineer capable of doing part-time drafting in headquarters office and survey work in the field. MECHANICAL ENGINEER, a permanent position as supervisor of mechanical maintenance and installation. Pipe-line experience required. Headquarters Tulsa. State qualification, draft status, age, and salary desired. Box C-122, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL ENGINEERS with experience in any of the following petroleum refining operations (1) light ends recovery equipment, absorbers, stabilizers, etc. (2) catalytic cracking equipment or (3) crude distillation equipment and similar processing units. State in detail educational background, positions held with detailed explanation of work handled, age, and number dependents also draft status. Box C-165, The Oil and Gas Journal, Tulsa, Okla.

WANTED
PUMP DESIGN ENGINEER

Capable of designing single and two-stage centrifugal pumps. Also with executive ability and mechanical knowledge for supervision of engineering department. Position is permanent with reliable, well-established company located in Middle West that has been in business 30 years producing pumps and other process equipment.

In reply state experience, education, age, marital status, draft classification and salary expected. Include snapshot.

Replies strictly confidential. Box C-164, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

WANTED: Chemist familiar with manufacture of White Oils and Sulphonates. Give age, experience, references, salary expected, draft status and when available. Box C-153, The Oil and Gas Journal, Tulsa, Okla.

REFINERY CHEMISTS
Refinery analytical chemists and low and high temperature fractional operators wanted for work in 100-octane plant. Write Personnel Manager, Associated Refineries, Inc., Duncan, Okla. W.M.C. Certificate necessary.

WANTED: Experienced salesman for southwest territory by large alloy tube manufacturer. Write to Box B-995, The Oil and Gas Journal, Tulsa, Okla., giving full details.

• • • • WANTED • • • •

Major oil company with continent-wide operations and research seeks graduate technical men of the following qualifications:

MECHANICAL ENGINEERS—with petroleum refinery or similar experience. Should be familiar with refinery design, estimating, construction, mechanical equipment, engineering materials, and utilities systems. Process knowledge desired although not essential.

CHEMISTS AND CHEMICAL ENGINEERS interested in research, design, or plant operation. Should have training and experience in refinery or other industrial organizations.

Work not of a temporary nature. In reply state experience, education, age, marital status, draft classification and salary expected, include small snapshot (not returnable). Replies strictly confidential. Applicants now employed at highest skill in war industries not solicited. Box B-970, The Oil and Gas Journal, Tulsa, Okla.

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WANTED, by a leading steel manufacturer; experienced field engineer for oil country tubular goods work; also want experienced man for sales and sales engineering work on seamless and welded mechanical and pressure tubing; Attractive opportunities. Write in full to Box C-160, The Oil and Gas Journal, Tulsa, Okla.

PROCESS ENGINEER
Two Process Engineers, also two Junior Process Engineers. Must have chemical, mechanical or petroleum engineering degree. W.M.C. Certificate necessary. Write Associated Refineries, Inc., Box 831, Duncan, Oklahoma.

PRODUCTION AND DRILLING ENGINEER with practical experience in all phases drilling and production capable assuming full responsibility and supervision of operations well established independent company. Good salary. Box C-161, The Oil and Gas Journal, Tulsa, Okla.

OLD established oil field manufacturer wants man to work the field in Illinois basin. Salary $200.00 and expenses. Car furnished. State qualifications completely and draft status. Box C-166, The Oil and Gas Journal, Tulsa, Okla.

WANTED: MECHANICAL DRAFTSMAN to be located in Shreveport, preferably with experience in piping layout and foundation work. Apply to P.O. Box 142, Queensboro Station, Shreveport, La.

PIPE-LINE PUMP STATION ENGINEERS Familiar with diesel type engines, for work in Oklahoma. 48-hour week. Major oil pipeline company. State qualifications, draft status, age, and salary desired. Box C-123, The Oil and Gas Journal, Tulsa, Okla.

SITUATIONS WANTED

GEOLOGIST, 18 years experience drilling wildcats and field wells in southwest Texas; now chief Geologist, Independent Oil Company; would consider similar position with operator who would allow personal Royalty and Lease trades. Draft Classification 2-AH. Box B-975, The Oil and Gas Journal, Tulsa, Oklahoma.

WITHIN 250 miles of St. Louis—20 years experience refinery and gasoline plant construction, operation, design. Complete charge small scale operations. Technical training. Box C-126, The Oil and Gas Journal, Tulsa, Okla.

GEOLOGIST, 10 years geological, 5 years land, title-curative experience Mid-Continent and Illinois districts, desires job with strong independent operator. Draft exempt. Box B-119, The Oil and Gas Journal, Tulsa, Okla.

REFINERY ENGINEER would like to associate with refinery equipment or supply house on West Coast. Age 43, thoroughly experienced all types of refinery equipment. Box B-993, The Oil and Gas Journal, Tulsa, Okla.

MIDDLE AGE man wants position as farm boss, or pump and look after production. Reference exchange. Box B-976, The Oil and Gas Journal, Tulsa, Okla.

ATTENTION manufacturers interested in sales representation Northern Mid-Continent and Rocky Mountain areas: Former district manager large service organization is establishing sales agency and desires to contact manufacturers of drilling and/or production equipment and service materials that will justify personal, individual coverage in these areas, including Alberta, Canada. Over 20 years' experience and wide personal acquaintance with both operators and management of oil companies in areas mentioned. Not yet ready to make announcement but write or wire: Sales Representative, Box C-143, The Oil and Gas Journal, Tulsa, Okla., and I will supply additional information or arrange interview.

LAND MAN: Single man, age 50, wishes to make new connection along following lines: Abstracter of land titles by profession; wide experience in leases, agreements, contracts, rights of way, payments of lease rentals, damages, etc. Will consider any inquiry; prefer part time outside employment. Any location. Box B-992, The Oil and Gas Journal, Tulsa, Okla.

OVER 20 years general refinery sales, traffic, oil marketing, experience, now employed, desires immediate change. Age 42, married, good salary required. Best references as to ability, etc. Box C-162, The Oil and Gas Journal, Tulsa, Okla.

GRADUATE MECHANICAL ENGINEER—young and aggressive, with 8 years sales, service, and engineering experience, wants responsible position with progressive manufacturer of oil-field equipment as their representative or agent. Pacific Coast area preferred. Box C-163, The Oil and Gas Journal, Tulsa, Okla.

LAND AND LEASE MAN and general production and field experience throughout the Mid-Continent area, capable of forming drilling block, leasing, title work, drilling contracts and carrying deal through to completion. Would like connection with Oil Company, Independent or leading Geologist and if possible with a good future. Box B-118, The Oil and Gas Journal, Tulsa, Okla.

FINANCING

CAPITAL SEEKERS—Interested in raising $25,000 or more for a legitimate project should write to AMSTER LEONARD, Fox Theater Bldg., Detroit 1, Mich.

FOR SALE—MAPS

FOR SALE—MAPS

685 oil fields in South Texas and Louisiana now mapped and maintained daily; show all intimate details of ownership and development. 2 ft. square. Price $3.50 for each field. Also County and Base Maps.

ZINGERY MAP CO. Houston, Tex.

Classified Advertising

EQUIPMENT FOR SALE

FOR SALE: Four 10 x 4½ x 10 Duplex Steam Pumps, make Worthington and Gardner-Denver. Good condition. Inquire T. T. Eason & Co., Enid, Okla.

1 ALLIS-CHALMERS 68-hp. four-cylinder stationary motor equipped 12x12 V-belt pulley. 1—5-kw. Westinghouse 110-d.c. steam turbine generator. 1—10½x12 Oil Well Supply drilling engine. 1—35-hp. Caterpillar tractor. 1 Gardner Denver twin Air Compressor, cylinders 12 x 5½ x 12 and 12 x 12, 500 lb. capacity. Critchett & Woods Lumber Co., Olla, La.

1 STAR K type, one Cardwell H. Spudder with all tools complete. International DS 35 Truck. Going out of business. Ruth Mays, Box 191, Vandalia, Ill., telephone 668W.

USED POWER PLANT EQUIPMENT

BOILERS:
4—Vulcan 66"x18' Fire Tube H.T. w/ Dust Grates
2—Vulcan 72"x18' Fire Tube H.T. w/ Dust Grates
3—B&W 250 hp. A. & T. W. T. w/ Grate 72-X
1—Fire Tube H.T. 84"x20' Vulcan
Boiler Feed Pumps, Injectors, Valves & Fittings, Gauges
Stacks—1 26"x125' 3 30"x125'
ELECTRIC MOTORS:
1—GE 60 Cycle 440 Volt 3 Phase AC 50 HP Type I Form L
1—Westinghouse 440 Volt 3 Phase AC 50 HP Type F
1—GE 60 Cycle 440 Volt 3 Phase AC 150 HP 575 RPM Form K with Starting Equipment
1—GE 60 Cycle 440 Volt 3 Phase AC 50 HP 570 RPM Form B
1—Burke 60 Cycle 440 Volt 3 Phase AC 100 HP 720 RPM Type EMV 20
SPEED REDUCER:
1—Jones 60 HP 16-1 Double Herringbone Gear
SPRINKLER SYSTEM & WATER TANK—1 Automatic Sprinkler Corporation of America System, including 125,000 gal. elevated tank.

MONTEZUMA LUMBER COMPANY
McPhee, Colorado

FOR SALE: At Chase, Kansas, Warehouse—1—Used T-140 Twin Crank Happy Pumping Unit, 336,000 inch-lbs. Peak Torque Rating, Cities Service Oil, Patridge, Bartlesville, Okla.

FOR SALE: One Black Bear (made by Oilwell Supply Company), complete and in running condition. 40 hp natural gas engine. One Black Bear, 40 hp natural gas engine complete. One Tico (Titusville Iron Works) natural gas 20 hp engine complete with clutch. KANSAS-NEBRASKA NATURAL GAS COMPANY, INC., Hastings, Nebraska.

FOR SALE: At Oklahoma City, 2—Used Cylinders Rebored and Fitted with New Piston Rings and Pin, 12" x 15" for Type Y, Style V F & M Vertical Oil Engine—$200 each. Cities Service Oil, Patridge, Bartlesville, Okla.

Compressors, Reshopped
4—80 HP. Clark, 1—11 x 5 x 12 Chicago-Pneumatic, 1—10 x 4¼ x 10 Ingersoll-Rand, 1—6 x 6 Twin Curtis, 1—4½ x 5 Ingersoll-Rand.

Pumping Engines, Reshopped
1—25 HP., 2—40 HP. 2-cycle Superior, 1—25 HP. 4-cycle Superior, 1—30 HP. Tico, 1—25 HP. Bessemer.

Stefco Sect. Steel Buildings
1—30 x 160 x 12, 1—16 x 24 x 16, 1—20 x 27 x 8, 1—8 x 10 x 8.

NOLAN SALES CORP., TULSA, OKLA.

Second Hand Oklahoma City alloyed sucker rods, ¾", ⅞", and 1"
Have sold millions of feet with satisfactory results. I recommend these rods up to 4,000 ft.
Tubing catchers, all sizes
M. R. TRAVIS
1702 S. Boulder Tulsa, Oklahoma

EQUIPMENT WANTED

WANTED: Propane storage tank suitable for 200 to 250# pressure: 10,000 to 30,000 Gal. capacity. Box C-147, The Oil and Gas Journal, Tulsa, Okla.

WANTED: Combination Dubbs Topping Plant operators; Combination power plant boiler operators; Pumpers; Still helpers, combination topping and cracking; Refinery Pump Mechanic, and refinery machinist. Location, inland Texas independent refinery. Box C-155, The Oil and Gas Journal, Tulsa, Okla.

WANTED
Unlimited quantity of
Structural Steel — Pipe — Tubing
Casings and Valves, all sizes
SONKEN-GALAMBA CORP.
Kansas City (18), Kansas

LEASES AND DRILLING BLOCKS

DEEP drilling, new fields, 2,094 wells producing. Montana oil fields face action, 1944! Keep in touch! Free trial subscription! Montana Oil Journal, Elks building, Great Falls, Mont.

ARKANSAS-Louisiana-Texas leases twenty acres up. Dollar acre up. Owners Box 1122, Little Rock, Arkansas.

NEW MEXICO
STATE OIL AND GAS LEASES
Humble Oil & Refining Co., now drilling a scheduled 7,500 foot test. Other major oil companies own lease blocks near test. I offer 40 acres and multiples thereof in same area. Write for information. HARRY S. WRIGHT, New Mexico State Lessee, Farmington, New Mexico.

LAND WANTED, also oil leases, anywhere in South, or Southwest U. S. Mention lowest price. Acreage also available for those planning to drill. Box 127, Capitol Hill Sta., Denver, Colo.

OPEN for Oil and Gas Lease: 2,720 acres in one body; and 2,465 acres in disconnected tracts of 160 acres and more, all located in Lost Soldier District, Wyoming. Inquire of L. J. Lincecum, Rawlins, Wyo.

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One day service
REGAN FLYING SERVICE
Shawnee, Oklahoma

RANCHES AND FARM LANDS

10,000 acre ranch Cimmaron County, Okla. Near Pure discovery well on one side and Hugoton field on other, not leased. Excellent ranch, large potential value. John P. Mathis, Box 1106, Amarillo, Texas.

BUSINESS OPPORTUNITIES

INVENTION for sale—outright or on royalty basis, Patent No. 2200688, on self-centering metallic gasket to be placed between flange of pipe joint. Designed to reduce time, cost of installation, increase efficiency. Inquiries are requested. E. C. Bridgers, P.O. Box 112, Bishop, Tex.

PATENT ATTORNEYS

PATENTS, Trade-Marks, Booklet, "General Information Concerning Inventions and Patents" and "Free Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 418, Bowen Bldg., Washington, D. C.

LEASES AND DRILLING BLOCKS

WEST TEXAS—New, long term leases, lowest price, cheapest rentals, large or small tracts. Do you have block anywhere you want drilled, OR do you want block to drill. Information and maps write: Box C-146, The Oil and Gas Journal, Tulsa, Okla.

LEASES ROYALTIES
PRODUCING OR NONPRODUCING
Texas, New Mexico, Oklahoma
Louisiana and Illinois.
10 Years' Experience
Inquiries Invited.
B. D. BUCKLEY
60 Broadway Drive, Clayton
St. Louis, Mo.

A WORTHWHILE OPPORTUNITY

We own properties in California, Illinois, Indiana, Kansas, Louisiana, Nebraska, Oklahoma, Texas.

All of our properties have been broadly classified for oil possibilities by DeGolyer and MacNaughton of Dallas, Texas. This outstanding firm of geologists have selected from our total holdings certain properties, comprising more than 50,000 acres, as immediately suitable for oil and gas prospecting.

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Journalisms:

BETWEEN World War I and the present conflict, there was a great advance in comprehension of oil-reservoir conditions. Three pressure-maintenance production practices have been developed which lead to conjoint injection of water and gas as their logical culmination. These are pressure maintenance by (1) restriction of output of gas, oil, and water; (2) restriction of output combined with water injection, and (3) restriction of output combined with injection of gas. In next week's issue, Frederick Squires will discuss pressure maintenance by conjoint injection of gas and water, as a wartime suggestion. He contends that such a method combines all the advantages of the restricted output, the gas injection and the water-injection-maintenance methods.

ABSTRACTS of several technical papers scheduled for delivery at next week's annual meeting of the A.I.M.E., Petroleum Division, New York, will be published in the February 24 Journal. This meeting has developed over the years into one of the top-flight technical assemblies, attracting outstanding engineering authors. As in the past, the Journal will give its readers the salient features of the technical and general discussion in abstract and summary form.

CUMENE, first produced commercially in May 1942, using a process perfected by Shell Development Co., is one reason for the superior aviation fuel being furnished the air forces of the United Nations. The story behind this blending agent, and how it is playing its part in winning the war, is told in next week's issue in a story by John P. O'Donnell.

CALENDAR

February

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, annual meeting, Waldorf-Astoria, New York, February 20-24.

AMERICAN SOCIETY FOR TESTING MATERIALS, spring meeting and committee week, Netherland Plaza Hotel, Cincinnati, Ohio, February 28 to March 3.

March

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, SOCIETY OF EXPLORATION GEOPHYSICISTS, AND SOCIETY OF ECONOMIC PALEONTOLOGISTS AND MINERALOGISTS, annual meetings, Dallas, Tex., March 21-23.

WESTERN PETROLEUM REFINERS ASSOCIATION, thirty-second annual meeting, Jefferson Hotel, St. Louis, Mo., March 28.

AMERICAN PETROLEUM INSTITUTE, Pacific Coast District, Division of Production, spring meeting, Biltmore Hotel, Los Angeles, Calif., March 23.

April

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, annual meeting, Rice Hotel, Houston, Tex., April 10, 11 and 12.

NATURAL GASOLINE ASSOCIATION OF AMERICA, annual meeting, Baker Hotel, Dallas, Tex., April 12-14.

SEVENTH ANNUAL MIDWEST POWER CONFERENCE, arranged by Illinois Institute of Technology, Palmer House, Chicago, April 13-14.

NATIONAL OIL SCOUTS AND LANDMEN'S ASSOCIATION, annual meeting, Dallas, Tex., April 24-25.

INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA, midyear directors meeting, Bradford, Pa., April 27, 28 and 29.

NATIONAL STRIPPER WELL ASSOCIATION OF AMERICA, midyear directors meeting, Bradford, Pa., April 27, 28 and 29.